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Delegates at the Agricultural Conference, Bundaberg, June 11th-14th, 1901.

Agricultural Conference.

The importance of the proceedings at the Bundaberg Conference is, at the present juncture, so significant that we feel sure our readers will willingly forego the *Journal* in its usual form for this month. Of the five Conferences held by the agriculturists of the State since 1897, we believe that of June, 1901, to have excelled the previous ones both in number of delegates, in the great extent of country represented; in the zeal and earnestness which the delegates brought to their work, and in the many thoughtful papers on subjects of the deepest importance not only to the single districts but to the national welfare itself. We need not enlarge on any of the subjects discussed. In the following pages it will be seen that the work of the Conference was entrusted to a body of thoughtful, highly intelligent, practical men—men with no small parochial ideas, men who can look ahead, and, foreseeing either danger or prosperity in the near future, came to that Conference prepared for either lot. But they came armed with facts and figures incontrovertible and undeniable, and brought to bear on the discussions the whole weight of their long practical experience. On the principle that "he is thrice armed who hath his quarrel just," they discussed certain topics in a temperate, conciliatory, but determined spirit. There were no stump orators, no agitators, at that Conference. The Northern men had said: "Come and see." The Southern and Central men's reply was to a man like Cæsar's laconic report: *Veni, vidi, vici*—only, instead of *vici*, they used *victus fui*. They came, they saw, they were overcome—that is, their preconceived ideas concerning the North vanished into thin air. We need say no more. The outcome of that Conference will be the far-reaching effect of its discussions and conclusions.

What remains to be said is merely to express our admiration at the unbounded hospitality of the men of the Burnett and Isis, at their anxiety that every delegate should see all that could be seen in so short a time, at the facilities in the way of trains, trams, and vehicles which they placed ungrudgingly at the visitor's disposal, and at the readiness with which all questions on the sugar industry were answered, and the openness which permitted the delegates to enter mills, stores, kanaka quarters, kitchens, hospitals—in fact, every place of which any delegate from the South might have formed a bad opinion before seeing with his own eyes. Some came to curse, but all left blessing.

An Agricultural Conference, organised by the Department of Agriculture, similar to the conferences held at Gatton in 1897, at Rockhampton in 1898, at Mackay in 1899, and at Warwick in 1900, was held at the Queen's Theatre, Bundaberg, on the 11th, 12th, 13th, and 14th of June, 1901, and was attended by representatives from practically all the leading agricultural, horticultural, and pastoral societies of the State. There were present:—

The Hon. D. H. Dalrymple, M.L.A., Secretary for Agriculture, in the chair.

National Agricultural and Industrial Association of Queensland, Brisbane—J. A. Hayes and P. Frankel. Queensland Acclimatisation Society—L. G. Corrie and E. Grimley. Queensland Fruit and Economic Plantgrowers' Association, Brisbane—W. P. Cooksley and C. Atthow. Horticultural Society of Queensland, Brisbane—J. Soutter and W. Ewart. Queensland Nurserymen's Association, Brisbane—John Williams and F. Ridley. United Pastoralists' Association of Queensland, Brisbane—T. de M. Murray-Prior. Zillmere Horticultural Society—J. W. Lee and W. Jacklin. Upper North Pine Farmers' Association—F. Williams and C. Hay. Mapleton and Dulong Fruitgrowers and Farmers' Progressive Association—H. Johnson. Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society—G. L. Bury and E. H. Biggs. Woodford Progress Industrial Association—J. B. Lowry and J. B. Fletcher. Maroochy Pastoral, Agricultural, Horticultural,

and Industrial Association, Woombye—J. Rose, junr., and H. V. Fielding. Palmwoods Industrial Fruitgrowers' Progress Association—G. Fewtrell and F. J. Johnson. Razorback Fruitgrowers' Association—J. R. Dart and E. Dalton.

Agricultural and Pastoral Society of Southern Queensland, Beenleigh—G. F. Dauth and J. Williamson. Logan Farming and Industrial Association, Beenleigh—F. W. Peek and W. Mann. Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association—H. Heinemann and J. Holzapfel. Southern Queensland and Border Agricultural and Pastoral Association, Nerang—A. T. Bignell and J. W. Lee.

Ipswich and West Moreton Agricultural and Horticultural Society, Ipswich—J. Ball. Lockyer Agricultural and Industrial Society, Blenheim, Laidley—J. Fielding and C. Gunne. Rosewood Farmers' Club—T. E. Coulson and P. H. Adams. Fassifern and Dugandan Agricultural and Pastoral Society, Boonah—T. de M. Murray-Prior and A. Moffat. Forest Hill Farmers' Progress Association—A. McAllister and T. Burgess. Helidon Scrub Farmers' Progress Association—J. Tysoe and J. Scanlan. Drayton and Toowoomba Agricultural and Horticultural Society—W. R. Robinson and G. Searle. Royal Agricultural Society of Queensland, Toowoomba—F. Burtt. Pittsworth Pastoral, Agricultural, and Horticultural Association—J. J. Daniel and J. Trott. Eastern Downs Horticultural and Agricultural Association, Warwick—J. Wilson and J. Tulloch. Central Downs Agricultural and Horticultural Association, Allora—W. Deacon and J. Gilmour. Border Agricultural, Pastoral, and Mining Society, Stanthorpe—H. Tausk and A. W. Whittard.

Western Pastoral and Agricultural Association, Roma—R. C. Lethbridge and W. M. Miscamble. Wallumbilla Selectors' League—W. Williams and E. Maller. Hodgson Farmers' Association—P. Hoskin.

Gympie Agricultural, Mining, and Pastoral Society—A. J. Fisher and R. H. Cox. Gympie Central Farmers' Association—J. H. Maynard and J. Pike. Gympie Horticultural Society—J. Davies and A. L. Roberts. Pie and Eel Creek Farmers' Association, Gympie—J. Ogden and E. Lorenson. Deep Creek Farmers' Progress Association, Gympie—T. Lorenson. Chatsworth Farmers' Progress Association, Gympie—R. G. Allen and H. G. Percival.

Wide Bay and Burnett Pastoral and Agricultural Society, Maryborough—J. E. Noakes and P. Biddles. Tinana Fruitgrowers and Farmers' Association—H. G. Habler. The Island Farmers' Progress Association, Maryborough.—J. E. Dean and C. Rasmussen. Pialba Farmers' Association—M. L. Gataker and W. T. Yeates. Biggenden Agricultural and Pastoral Society—J. Trigger. Mungore Farmers' Association, Lakeside—J. Trigger and M. Ridley. New Hope Planters' Association, Birthamba—E. Newitt and J. W. Nixon.

Bundaberg Council of Agriculture—C. F. Neilson and R. Jones. Bundaberg Horticultural Society—A. T. Coomber and H. E. Ashley. Booyal Farmers' Progress Association—T. Skillington. Currajong Farmers' Progress Association—C. M. Limpus and G. Robinson. Isis Agricultural Association, Childers—W. Day and W. W. Woodman. North Isis Canegrowers' Association, Hapsburg—J. Smith and W. Young. Kolan Canegrowers and Farmers' Association—J. Clark and C. Marks. South Kolan Agricultural and General Progress Association—Hon. Angus Gibson, M.L.C., and G. Butler. Avondale Planters and Farmers' Association, Yandaran—A. M. Brown and N. J. Mikkelsen. Woongarra Canegrowers and Farmers' Association, Bundaberg—D. Watson and H. Cattermull.

Rockhampton Agricultural Society—J. McPherson. Central Queensland Farmers and Selectors' Association, Rockhampton—J. Davies and N. Anderson. Central Queensland Stockowners' Association, Rockhampton—T. S. Huggins. Alton Downs Farmers' Association, Rockhampton—C. Bennett and W. Walters.

Pioneer River Farmers' Association, Mackay—E. Denman and E. Swayne. Mackay and District Horticultural Society—D. Buchanan. Bowen Pastoral, Agricultural, and Mining Association—G. Turner and D. Miller. Bowen Fruitgrowers and Farmers' Association—T. Jensen. Townsville Pastoral, Agricultural, and Industrial Association—C. R. Hopkinson. Lower Burdekin Farmers' Association, Ayr—W. H. Wilmington. Herbert River Farmers' League—N. C. Rosendahl. Halifax Planters' Club—A. Anderson. Geraldton Farmers' Association—L. Moody and J. O'Malley. Herbert River Pastoral and Agricultural Association, Ingham—D. Pearson. Victoria Farmers' Association, Ingham—P. Feldt and W. Johnson. Stone River Farmers' Association, Ingham—H. Stone and F. Fraser. Cairns District United Farmers' Association—E. Robert and W. Griffin. Hambledon Planters' Association, Cairns—W. G. Scott and A. M. Stephens. Cairns Agricultural, Pastoral,

and Mining Association—Thos. Binnie and G. R. Mayers. Port Douglas Pastoral, Agricultural, Horticultural, and Mining Association—H. C. P. Crees and J. Reynolds. Mosman River Farmers' Association, Port Douglas—T. W. Crawford and J. D. Johnston.

Officers of the Department of Agriculture: Messrs. Peter McLean (Agricultural Adviser), John Mahon (Principal of the Queensland Agricultural College), J. C. Brünnich (Agricultural Chemist), A. H. Benson (Instructor in Fruit Culture), A. J. Boyd (Editor of the *Queensland Agricultural Journal*), R. W. McCulloch (Inspector and Valuator under the Sugar Works Guarantee Act), D. Jones (Inspector, Diseases in Plants Act), H. Tryon (Entomologist), Dr. Maxwell (Director of the Bureau of Sugar Experiment Stations). Mr. C. J. Pound, the Government Bacteriologist, was also present.

FIRST SESSION.

TUESDAY, 11TH JUNE, 1901, 7·30 P.M.

Proceedings were commenced by the Mayor of Bundaberg (Mr. Steindl) welcoming the delegates to the city, to which the Chairman suitably replied. The roll was then called, 145 gentlemen answering to their names. A letter was read from Mr. John Cameron, regretting his inability to attend, and stating that his duties as representative of the United Pastoralists' Association of Queensland at the Conference would be undertaken by Mr. T. de M. Murray-Prior.

THE LATE HON. J. V. CHATAWAY.

Mr. E. DENMAN (Mackay): Since we last met, the State has lost a zealous and capable Minister, and the agriculturists of Queensland a most sincere and sympathetic friend, through the death of the late Honourable, and still honoured, J. V. Chataway. Before the regular business commences, I would therefore like to move—"That this Conference desires to place on record its appreciation of the splendid services rendered to the agricultural interests of Queensland by the late Hon. J. V. Chataway."

The motion, which was briefly and feelingly seconded by Mr. J. E. NOAKES, of Maryborough, was then carried.

Mr. E. SWAYNE (Mackay): I have also a motion, the moving of which is about the most painful duty I have ever been called upon to perform. I beg to move—"That this Conference desires to convey to Mrs. Chataway and her children its heartfelt sympathy with them in their bereavement."

The motion was seconded by Mr. W. DEACON, of Allora, and carried.

The Hon. D. H. DALRYMPLE then delivered the following opening address:—

CHAIRMAN'S ADDRESS.

GENTLEMEN,—While I am glad to welcome you to this Conference, and proud to take the chair during your deliberations, I deeply deplore the circumstances that have led to my being placed in the position. It would be impossible for me not to recall at this moment the memory of my late friend and colleague who on previous occasions of this kind acted with so much tact in the same capacity. The event we all deplore was not one that will be speedily forgotten. Not only was the late Mr. Chataway the personal friend of all of us; not only was he a faithful public servant prepared to subordinate his health and ease to the welfare of the State; but he was a man exceptionally qualified by his talents, tastes, and acquirements to control the great Department which is specially charged with the care of your interests. I have been long enough his successor to know how onerous were the duties he had to perform, and with what singleness of purpose and tirelessness of effort he applied himself to his task. Whatever might be his state of health, his energy as an administrator never flagged, and he refused to quit his post until, only a week or two before the inevitable hour came, the medical men whom he consulted informed him

that his one faint hope of recovery was his immediate relinquishment of all business. So recent, indeed, was his connection with active public affairs, that the preliminary steps for holding this very Conference were taken under his direction; and it is a grief to me and, I am confident, a grief to you that he did not live to complete the preparations he had entered upon, and to preside with all his old courtesy and geniality at your deliberations this week. We have passed resolutions expressive of his great public services, and conveying your sympathy to those near and dear to him now mourning their loss. But, whatever fate wills to any of us, the business of the country must be carried on, and we must pass on to the discharge of the duties which have called us together—the discussion of matters affecting the industries of the State.

THE PASTORAL INDUSTRY.

Although the continuation of the drought affected the whole of Western Queensland throughout the past year and during the earlier months of the present year, causing unprecedented losses in stock, yet, as a whole, the State has experienced some advantage through the very substantial advance in the price of stock of all descriptions. The favour with which our meats have been received in South Africa, and the large quantities shipped thither, as well as to Japan, the Philippines, China, Hong Kong, and Singapore, have increased the prices of our cattle and sheep to a level unknown for many previous years, and the steady demand for our horses for South Africa and India has given a payable value to what has hitherto been an unprofitable asset. Sufficient rains have now fallen over the greater portion of the drought-stricken area to ensure winter feed for the stock left on it. Although the abnormally high prices obtaining for wool during the 1899-1900 season were not maintained, the values during the past season have been much above the bedrock prices of three years ago, and closing were considerably in advance of opening rates. The meat export trade is now on a very firm basis; and the quality of the Queensland canned meats is such that they are now preferred to any others in Africa, in the Mediterranean ports, and in the East. With a continuance of the present favourable conditions, sufficient fat stock will be available to keep the principal meat establishments in operation for the season, and everything points to the fact that the days of the wasteful treatment for hides and tallow have passed away for all time. I regret to say that the value of our exports of wool, live stock, tallow, extract, hides, and skins show a total decrease for the year of £1,950,069, the only set-off against which being an increase of £178,611 in the export of frozen and preserved meats.

MEAT AND DAIRY PRODUCE ENCOURAGEMENT.

No new meatworks have been erected during the year under the Meat and Dairy Produce Encouragement Acts, but it is gratifying to note that all claims have been met by the works that have received advances, thus enabling a dividend to be declared payable, on the 30th instant, to the original contributors under the Act of 1893, in the Southern and Northern districts, as provided by the Amendment Act of 1895. All the meatworks advanced upon, with the exception of one or two, had highly successful seasons, and worked nearly throughout the whole season, although the stock treated reached prices unheard of before in the history of the State. This is, in some measure, due to the fact that our tinned meats have now reached a high level of excellence, which ensures a steady outside demand for them in preference to other meats.

BACON AND HAM.

In bacon and ham the advance for the year has been very satisfactory. Taking the figures as a guide, we find that the manufacture was 7,685,446 lb., an addition of 537,686 lb. to that of 1899. The exports were of the value of £31,067, or some £14,764 over the value for 1899. Moreover, the quality has improved with the quantity. Breeders now pay considerable attention to their stock, and it is not now generally considered that any pig is good enough for bacon or that any food will do for a pig.

DAIRYING.

The butter manufactured in 1900 was 8,215,339 lb., 247,256 lb. less than in 1899. The exports were, however, in value, some £2,233 in excess of the previous year. It is satisfactory to know that, although dairying was so hampered by drought, the trade outside Queensland more than maintained the normal conditions and retained the commercial side of the industry unbroken. A point to be remarked is the development in the manufacture of cheese. In 1899 we made some 1,900,300 lb.; but last year our output reached 2,461,730 lb., or an increase of 561,430 lb. in one year. It is a notable fact that, during the year, the erection of large modern butter factories has increased not only in the Southern portion of the State but in the Central and Northern divisions also. Factories have been erected, under the provisions of the Meat and Dairy Produce Encouragement Act, at Mackay and Capella; and inquiries have been made from other Northern centres, such as Proserpine and Ayr, as to the terms upon which money can be obtained for such purposes. As for the Southern districts, a large factory at Booval, on the co-operative principle, has been just completed, and at Maryborough a similar factory has been at work for some time. This class of factory, if properly managed, has a bright future, and from the promising start made by each of these works it is expected that they will have to be increased in size at no distant date. A movement is on foot in several of the districts where central sugar-mills exist to erect co-operative butter factories, and thus assist the sugar farmers by providing a certain and remunerative addition to their cane farming. As a proof that these factories are paying concerns, it may be mentioned that, so far, every dairy factory has met its liabilities to the fund, and at the same time paid the producer the highest prices for his milk and cream. Another feature of the year's operations is that a second condensed milk factory is now in course of erection, Mr. Charles Sealy, of the Trelawny Cheese Factory, being the proprietor. This will be the largest of its kind in Queensland, and its erection, as that of another unsubsidised factory of the same kind at Helidon, is no doubt due to the success obtained by the Cressbrook factory erected in 1898 by Messrs. McConnell and Munro, the demand for whose milk has necessitated the duplication of their factory. Closely allied to this form of factory is the Commonwealth Factory at Beaudesert, erected during the year, which turns out what is known as concentrated milk, largely used by the coastal steamboats, as it keeps fresh for a period of from seven to ten days, and thus enables passengers to be supplied with practically fresh milk during the voyage. This factory, it is understood, has successfully competed with the Southern factories of its kind, and it is gratifying to hear that the A.U.S.N. Company have given a contract to supply all their boats trading north from Brisbane.

AGRICULTURE.

It was thought that the drought last year would necessitate a doleful account of agriculture in Queensland for this year's Conference, but the statistics of the Registrar-General show a very satisfactory state of things considering the ordeal that has been undergone. In some agricultural districts, it is true, the drought was severe, but in others a fairly good season was experienced, so that, on the whole, the history of Queensland agriculture during the period is not as disheartening as might have been expected. Taking, for a first review, wheat farming, it will be found that in 1900 for grain (excluding hay and green feed) the area under cultivation showed an increase of 26,777 acres, the area for 1899 being 52,527, and for 1900 79,304 acres. The yield amounted to 1,194,088 bushels, making this year a record one, and giving an average of 15·08 bushels to the acre. How satisfactory this yield is, may be seen by comparing it with that of other wheat-producing regions. In Argentine the average return is 12·5 bushels; in the United States, 12·29 bushels; in New South Wales, 10·60 bushels; in South Australia, 7·15 bushels; in Manitoba, 8·90 bushels; and in Victoria, 8·84

bushels. Of the other cereals, malting barley shows an increase in area of 291 acres over the area cultivated in 1899, and maize an increase of 17,485 acres. Against this must be placed a decrease of 329 acres for oats, 232 acres for barley, 47 acres for rye, and 48 acres for rice. Taking the grain crops together, the totals show that there were 215,618 acres under crop in Queensland in 1900 as against 171,721 acres in 1899, an increase of 33,887 acres. The Registrar-General, in an interesting table compiled by him, arrives at the conclusion that the production of wheat in this State in 1900 equalled 33 per cent. of the requirements of the people, as against 22 per cent. in 1899. Cheering as the progress has been, it will thus be seen that there is yet abundant reason for more land to be placed under wheat before the supply meets the demand.

SUGAR.

Owing principally to the severe drought experienced in the Northern districts, and to the frosts in the Southern, the production of sugar for the past season, 1900, shows a very considerable decrease from that of the previous year. The total area under cane in 1899 was 110,657 acres as against 108,535 acres last season. Of this area, 79,435 acres were crushed during 1899 as against 72,651 acres last season, the average yield of cane per acre being 11·6 in 1900 as against 14·8 in 1899, and the average yield of sugar per acre 1·28 tons as against 1·55 tons, the figures in every case showing the inferiority of last season's results. The output of sugar for 1899 was 123,289 tons as against 92,554 tons in 1900—a decrease of 30,735 tons, involving a money loss of about £307,000, of which about £138,000 falls on the canegrowers. It is interesting to note that the only district in Queensland where irrigation is comprehensively dealt with—that is, the Burdekin—gives a yield of 1·88 tons of sugar per acre. The only direction in which the sugar statistics of last season show better results than in the previous season is in the quantity of cane requisite to make a ton of sugar having decreased by half-a-ton which should perhaps be attributed to improved manipulation at the mill. The quantity of sugar exported from 1st June, 1900, to the 31st of March, 1901, was 54,586 tons; add to this 27,000 tons, the estimated consumption of Queensland, thus leaving 10,968 tons held in the State. As for the future of the sugar industry in this State: By the passage of the Sugar Experiment Stations Act the Government have shown their desire to do all in their power to help the industry, and, under the guidance of Dr. Maxwell, the industry will now be conducted on definite scientific lines, and it is hoped with the same splendid success he has achieved elsewhere. It is gratifying to note that in the proposed formation of the Sugar-Growers' Organisation the first step has been taken to give effect to the special services of Dr. Maxwell. It is only by means of such an organisation that his investigations and advice can be brought home to every individual engaged in the industry.

FRUIT.

Fruit culture continues to make steady progress both as regards the output of fruit and increasing planting. During 1900 the export of fruit amounted to £104,385 as against £93,187 in 1899, being an increase for the year of £11,198. The increase in planting applies both to deciduous fruits in the cooler parts of the State—the Stanthorpe district in particular—and to the citrus and other semi-tropical fruits in the more humid coastal districts. The planting of fruit trees of all kinds in commercial quantities during 1900 probably exceeded that of any previous year in the history of the State, and judging from the very large number of deciduous fruit trees now being imported from the Southern States for planting in the cooler districts, as well as the local demand for citrus and other semi-tropical fruits, the planting of 1901 bids fair to exceed that of last year. It is satisfactory to note that orchardists now realise the importance of planting only such varieties as are best adapted to the local conditions of the district in which they are to be grown; so that the greater proportion of the recent plantings will produce fruit of high commercial value when the trees come into bearing. This is a matter of extreme importance

when we have to place our fruits on outside markets—a condition of the industry that we shall reach ere long—as our local demand and that of the Southern States will soon be over-supplied by local production. The question of opening up new markets for our fruit has been carefully considered by the Department, and an experimental shipment of oranges was sent to Vancouver on the 20th July last year. The fruit was obtained from the Buderim Mountain and Woombye districts, and was sent as ordinary cargo. The net return was 3s. 11·85d. per case for 105 cases sent. As the fruit was worth only about 2s. 6d. per case in the local market at the time of shipment, the experiment was considered fairly successful. The chief value of the experiment, however, was that it proved the carrying and keeping qualities of our fruit when properly handled and packed. The importance of careful handling and of the use of suitable cases was exemplified, and it is felt that these considerations are essential to the successful establishment of a profitable export trade. The importance of keeping fruit trees and fruit free from insect and fungus pests is becoming generally realised. The Departmental cyaniding plant has been kept fully employed, and several private outfits have been established in various parts of the State, the results on the whole being highly satisfactory. The spraying of strawberries, vegetables, and fruit trees is distinctly on the increase, growers finding out by experience that it pays to keep their trees and plants free from disease. Experiments were conducted with a view to preventing the damage done by the fruit fly, the means employed being the covering of the trees with a cheap netting. These experiments were a complete success, trees so covered ripening their fruit free from maggots when the fruit of adjacent trees was worthless. This is considered to be of great importance to those who grow a limited amount of fruit for home consumption, and there is no question that it will be found profitable to cover all trees of medium size that produce fruit of high quality for which, when free from maggot, there is always a good demand at remunerative rates.

VITICULTURE.

The area under vine cultivation in Queensland last year was nearly 2,000 acres, showing an increase of about 300 acres on the two preceding years. To judge from the demands made to this Department for cuttings this season, the area is being rapidly extended, applications for upwards of 8,000 cuttings in excess of last season having already been made. Fruitgrowers are beginning to find out that a vineyard properly looked after is a paying undertaking, and that the demand for grapes exceeds the supply. If table grapes are sold at as low as 1d. per lb., the return from an acre of vines is not less than £18; and if sold at 2d. per lb., a common price, the return is £36 per acre. Wine grapes would return not less than £10, and turned into wine by the grower himself would realise much more. The cost of cultivation in both cases is about £3 per acre, if labour is employed. Much of the grape crop for 1899 was injured by frost, yet it totalled 3,230,627 lb. weight of grapes, which, calculating the value of the wine made from the wine grapes, has a total value of £46,000. Experiments are being carried on at the State farms with a view to establishing in Queensland one or more of the Almeria varieties; if successful, a large export trade in grapes to Canada and Great Britain would grow up. Experiments in currant growing and drying are being also carried on; the imports of currants into this State for 1899 were 1,636,185 lb., with a value of £13,646.

Some of the finest varieties of European wine grapes have been imported by the Department for propagation and distribution, which should eventually materially assist in improving the quality of Queensland wines. With regard to winemaking, we have a satisfactory proof that some of our vignerons appreciate the assistance given them by the Viticulturist, one winemaker having written to the Department to the effect that £500 a year had been put into his pocket by Mr. Rainford's services. Improvement in the quality of table grapes and wine is evident, although in the latter case the result is obtained more slowly.

TOBACCO.

Since the last meeting of this Conference an experiment farm for tobacco has been established at Texas, and $9\frac{1}{2}$ acres of desirable leaf has been successfully grown, housed, and cured. The varieties grown are those producing the favourite tobacco for the British and United States markets of the heavy pipe-smoking sorts. The results, so far, have been satisfactory. The industry is growing, and may be said to be in a fairly prosperous condition. White men are going more into the cultivation as they realise the value of the crop. New South Wales buyers have entered the market, and if the product proves satisfactory to them, and there is every reason to believe it will, the future of the industry is most promising. It is to be regretted that an interest has not been manifested in cigar tobacco, as under federation Sydney and Melbourne would give an outlet for considerable quantities, and at a fair price. These tobaccos can be grown on many of the alluvial soils north of Brisbane, below the Range, the crop being suitable for both the large and the small farmer.

COFFEE.

In view of the great demand for coffee, and of the suitability of a large portion of Queensland for its cultivation, nothing has been left undone to place the coffee-growing industry on a sound basis, and to bring before the growers the latest and most effective methods of production. For years the Department scattered broadcast the best literature on the subject, and in 1899 appointed a most competent expert to give practical assistance and instruction to the planters, with the result that at present coffee-growing, though not conducted on a very extensive scale or in all the localities adapted for it, is one of the most prosperous of our industries. So favourable, indeed, is our seaboard from Rockhampton northward, so far as climate and soil are concerned, for the cultivation of coffee of the best kind, that Queensland within the next decade will be able to supply the coffee required for the whole population of the Australian Commonwealth.

BUSINESS OF THE CONFERENCE.

There are other objects of culture which have not yet attained the importance of those already mentioned, and which I shall not refer to particularly, as I am anxious that we should proceed without further delay to the business for which we have assembled. The list of matters to be considered is a lengthy one, and time must be economised if we are to do justice to them. The subjects to be debated are, in the main, of the highest interest to the farming community. That they will be treated with knowledge and skill, and that our deliberations will have satisfactory results, I have not the slightest doubt. The Department I have the honour of being entrusted with is largely an experimental and educative one. It is admitted that our staff of specialists has been judiciously chosen, and that each, in his own province, is of the greatest assistance to the farmers. But, gentlemen, much as you may learn from our experts, the amount you may learn from one another is by no means inconsiderable, and I regard this Conference, properly conducted, as one of the best of all schools of mutual instruction and improvement.

At every meeting I shall be an attentive listener, for I am willing to learn a great deal about agricultural problems from those whose worldly success depends on the completeness with which they solve them. In conclusion, you may be sure that the opinions you express on the questions to be discussed will be highly regarded by the Government and by the Department of which I am the Minister, should they at any time come before us for consideration or settlement.

COMMITTEE OF RESOLUTIONS, &c.

It was resolved, on the motion of Mr. P. McLean, that the following constitute a committee of resolutions:—Messrs. E. Denman (Mackay), A. Moffat (Harrisville), W. Deacon (Allora), T. de M. Murray-Prior (Maroon), Hon. Angus Gibson, M.L.C. (Bundaberg), C. Atthow (Brisbane), W.

Miscamble (Roma), G. Turner (Bowen), A. M. Stephens (Hambledon), I. Andrews (Nerang), and Peter McLean (Agricultural Department)—the last-named gentleman to be convener.

On the motion of Mr. McLean, it was decided that delegates should not speak more than once on one subject, nor longer than five minutes; the reader of a paper, however, to be allowed ten minutes to reply.

BUSINESS FROM WARWICK CONFERENCE.

Mr. McLean reported on the action that had been taken with reference to the resolutions of the last Conference. The resolution relative to noxious weeds had been forwarded to the proper authorities, in order that its recommendations might be included in the Local Government Bill. In consequence of Mr. Deacon's motion on the subject of malting barley, the Department of Agriculture had sent to England for seed of certain varieties of malting barley. Previous to that, the Department had imported seed of two excellent varieties which were now being cultivated on the State farms. As for the paper by Mr. Castles, he was sorry to say that shortly after the last Conference Mr. Chataway took seriously ill, and practically little had been done in connection with the resolution relative to that paper. A copy of the resolution suggesting the stricter enforcement of the Diseases in Plants Act had been sent to all the horticultural and agricultural societies of the State, with a request for an opinion thereon. The replies in the great majority of cases had been against the spirit of the resolution. He might state that the strict enforcement of the Act would probably necessitate an annual expenditure approaching £10,000. At present the Department were depending largely on the fruitgrowers themselves to carry out the provisions of the Diseases in Plants Act. In compliance with the wishes of the Conference, the Government had introduced and passed through the Legislative Assembly a Bill dealing with the subject of agricultural credit. As they were all doubtless aware, however, the Bill had been thrown out in the Upper House.

Mr. W. Deacon, of Allora, then read the following paper on :—

FARMERS' ORGANISATIONS.

There are scattered throughout the State of Queensland about 130 organisations connected either with the pastoral, agricultural, or horticultural industries; as a glance at the last page of the valuable journal published monthly by the Agricultural Department will show. Their purposes are various, but the main and almost the sole object kept in view by many of them is the holding of an annual show. Now, I do not propose to any way to disparage such associations. These shows bring the farmers together, and they learn what their neighbours are doing. They prove the fitness of the district for various products, and bring to light any new varieties of its staples also. Besides, the presence of the experts of the Agricultural Department affords an opportunity to the real, live, and earnest farmer to get into contact with them, and acquire valuable information. The experts also, by noting any special excellence in the exhibits they are judging, can and often do discover the adaptation of the district for certain products—in other words, those which find a natural home there. Besides, the show is the farmer's day—his only holiday sometimes for the year—and I submit, as such, is preferable to the eternal races which formerly no rural district, however small, was able to dispense with. Nor have I much sympathy with those who hold that, because some central town has an annual show, no other place within a radius of from thirty to forty miles has a right to hold one. Small country shows are often naturally, both in the number and excellence of their purely agricultural exhibits, superior to those of the large towns; for farmers will not take their milking cows, their draught stock, their pigs, and their products of field and garden long distances. Neither the honour conferred by the certificates when they get them, nor the amount of the prizes in the current coin of the realm, compensate them for the expense incurred or for the too often loss of their exhibits. Nearly every village in England has now its annual cottage show, and why we, in important farming centres although not populous, should be continually lectured about small shows I cannot conceive. Although an annual exhibition may be the main object of these associations, the farmers at the meetings do not confine their conversation to prize schedules and by-laws; they exchange ideas, and compare notes about seed, crops, and stock,

and very often indeed drive bargains. I am speaking mainly of country associations whose large committees are composed mainly of farmers; and I admit with regret that there are some town societies in whose management farmers are conspicuous by their absence. It is a pity, but it is their own fault, for often the management is taken up by those engaged in other occupations, because apparently the farmers hold themselves aloof. Nearly all the organisations in what I may term the show category, whether of town or country, have done, in their way, excellent work in the advancement of agriculture in the past, and it is a matter of regret that the farmers do not take more interest in their proceedings, and afford them the practical support they so much deserve. They could then make them what they choose—educational, consultative, or to an extent co-operative; or even a chain of posts throughout the country to advance the various interests of their industry, or defend it against attacks in any form and from any quarter.

I observe a second class of organisation dealing with rural industries, on the page referred to, mainly educational, technical, or scientific, which hold no shows, nor give themselves much prominence, but which are doing a work, perhaps often silently and in the shade, of inestimable value. The members afford each other encouragement, and impart valuable information. They import and acclimatise new plants, and discover the economic value of those we have; and what is more, they raise a warning voice when any new pest, whether plant or insect, is insidiously seeking to take possession of the country. One might be pardoned for desiring an increase in the number of these associations and for more enthusiasm and vigour in their proceedings.

Now we have a large number of other associations, which I presume are to a certain extent co-operative, though not so in name. Some designate themselves as progress associations, others as industrial, and a few call themselves leagues. The precise functions of many of them will no doubt be explained by their delegates to this Conference. Possibly they exemplify the most valuable phase of co-operation—that is, of free and sympathetic intercourse and interchange of opinions and knowledge, of mutual help and counsel, and of combined action in obtaining seed and in the disposal of their products; and in various other ways which may be of vital import to their district. By these means they not only secure the welfare of the community as a whole, but stimulate individual effort as well. There is one function these classes of societies—in fact, all agricultural societies—might fulfil with very little trouble, and which would be of great advantage to the State as well as to the industry—viz., that of supplying monthly or quarterly reports of the state of the staple crops of the district to the Department of Agriculture, and, as the time of gathering them comes on, of the probable yield. Statistics of crops are far more important than is generally conceived, and prices in the market are ruled by the probable and what is termed the visible supply. As it is at present, newspaper correspondents—very often with the best of intentions—over-estimate probable yields, and there is a fall in prices in consequence. If the Agricultural Department cannot see their way to establish a statistical branch, I would suggest that they should request agricultural societies to furnish reports when they are needed, or at least once a year, of the probable yield of the crops in their district. Those who are acquainted with the industries will not find much difficulty in giving these estimates. A short time before last harvest the Agricultural Department applied to an official in the Government service for an estimate of the total acreage of wheat in the Allora police district, and the reply was 10,000 acres. Not being satisfied with this, they wired to me for an estimate. Without leaving my premises, I made it up as well as I could, and it was something over 19,000 acres, and after forwarding it I knew it was under the mark. The Registrar-General's return since issued shows that the actual area was 21,000 acres. I think this instance ought to show that the securing of estimates approximately correct and the collection of statistics are not such difficult matters as is generally imagined.

Now, there are four centres which apparently have made a distinct advance in agricultural combination. These centres are Mackay, Bundaberg, Herbert River, and the Isis; singularly enough, they are all in the sugar country. Bundaberg alone of all the districts in Queensland—as far as I am aware—has a chamber of agriculture, with which I presume are affiliated in some form most of the societies in the district. The Herbert River Farmers' League was, four years ago, one of the most influential and useful local organisations in Queensland—perhaps politically as well as industrially. What it is to-day, possibly its delegates will tell us. Of the Isis organisation I know nothing, but we are all more or less familiar with the Mackay association, which has branches throughout all that extensive district, and is of the highest value to each individual canegrower in various ways, inclusive of the sale of his cane and procuring his supplies.

Now, gentlemen, is it not time that we had something like this all over the country, and that societies in the same district at least should be federated, and some in the same town consolidated? When I gave my association the name of this paper, I did not know that Mr. Peek proposed to read one on "Councils or Chambers of Agriculture." I have no desire to take the wind out of his sails, so I shall avoid discussing the methods of closer union amongst farmers, and confine myself to affirming its necessity and advantage. Still, something in the way of a farmers' council is imperative. This is the age of union and consolidation. All industries are becoming consolidated. Throughout Australia the chambers of commerce, if not exactly federated, find it to their advantage to have constant communication with each other and work together. There are chambers of manufactures in all the colonies, and it is common knowledge that they have left no stone unturned in order to conserve their interests. I need not refer to another great organisation, which, not by the influence of members alone, but by acting together as one solid phalanx, nearly captured the State on a recent occasion, and apparently are determined to pursue their own real or imaginary interests regardless of those of other industrial classes. And where were the agriculturists and all those whose occupations are in one way or another connected with the soil on that same occasion? Queensland mining, commercial, and manufacturing interests, labour, and I was about to say "old age," are represented in Melbourne, but who represents the farmers? We have as much interest in the federal tariff as any industrial class in the community; and if a moderate scheme of protection is decided upon, who will advocate that its incidence shall be at all in our favour? Farmers are a very numerous body in the State, and if there were sympathy between them and reliance upon one another—if there were some links of union between their organisations throughout the State—no district and no particular section of them could be treated with injustice by any combination, political or otherwise. There is some sort of connection between farmers' associations, if not close union, in other States of the Commonwealth, and why should not there be in this? It may be urged that our interests are too often diverse, if not antagonistic; that fact, however, does not prevent community of action amongst farmers in America, for in the last issue of the London *Weekly Times* one of its American correspondents writes:—"The beet sugar-growers of Nebraska, the cane sugar-growers of Louisiana, the tobacco-growers of Connecticut, and the fruit-growers of California are leagued together against the reduction of import duties on sugar, tobacco, and fruit (from Cuba). They have their agents in Congress, and their friends everywhere in the Government." And if we were leagued together—I must not talk politics, I suppose—we should have our agents and friends where they would give us assistance when it is required.

Mr. JOHN DAVIES, of the Gympie Horticultural Society, then read his paper on—

HORTICULTURAL AND KINDRED SOCIETIES AS EDUCATIONAL MEDIUMS.

The full enjoyment of the possession of a home in any climate like Queensland is incomplete without a garden. The cultivation of flowers and vegetables creates a healthy rivalry, promotes social intercourse, and imparts practical knowledge to the observant individual; and, in submitting this paper to your consideration, I will endeavour to lightly touch on a few points on which, in my opinion, these societies will benefit the community at large.

Various societies claim, when holding their annual or biennial shows, that they are for the advancement of both agriculture and horticulture in their separate districts. But it is felt by most practical men that they are not nearly so valuable as they might be.

Government experts are available for lectures, object-lessons, &c., yet few societies avail themselves of these privileges. There is a great need for general knowledge in dairying, fruit, and vine culture, also in destruction of insects and other pests.

Complaints are often heard that shows are merely useful as excuses for holidays, meeting friends from distant parts, and a harvest for the tradespeople, as, after the show is over, all interest in it lies dormant until the next one.

Would it not be more instructive if, between these shows, monthly meetings were held at which various exhibits could be tabled, and opinions expressed between those present as to the growth and habits of the exhibit? In order to make these monthly meetings more attractive, I would strongly advise that a small prize be given for the best individual display. In my district this has been done, and has proved an unqualified success.

To get good attendances and greater interest in society work, practical utility must receive more recognition from us, or many a society will find itself in financial difficulties.

Many young members who attend these societies' meetings do not like to openly ask questions. To obviate this, my society has adopted what is called a "question box," so that anyone desiring information on any subject relating to the objects of the society has simply to write the question on a slip of paper, drop it in the box, and the required information will be given him by those present, if possible.

For instance, in my own personal experience I have been surprised at the simple questions that have been asked. This proves that many of the cottage and market gardeners have yet to learn the alphabet of gardening. This, I contend, is why monthly meetings should be encouraged (for the purpose of imparting information to those desiring it). There are many whose means will not allow them to send their sons to agricultural colleges; these are the persons our societies are trying to benefit, as the information given will suit the district in which they reside.

It is to be regretted, but it is a fact, that many good housewives express great pleasure in looking at the vegetables, &c., at show time, and often remark that it is the only time they see them. This is a matter that could be easily rectified if the different societies would educate their members so that they would be competent to start a cottage or market garden for the benefit of themselves, their families, and the community at large.

Often have I seen a young person sow seed in his garden in a very slipshod and haphazard manner, and if the seed does not germinate he at once blames the seed and the firm he bought it from. He does not think that the ants have taken it away, or the ground not suited to the class of seed he is putting in, and lots of other little matters. These are details that societies can teach them, and, instead of making gardening a source of disappointment, make it a source of pleasure and enjoyment.

Even in turning over one's garden soil, which seems a very simple operation, very few do it properly. Digging, it must be understood, means more than mere loosening of the soil. After the top layer has exhausted its producing properties, it naturally requires a rest; therefore if the top layer is placed at the bottom and the bottom soil at the top, say to the depth of a spit, a very decided gain will accrue to the cultivator.

There is nothing so honest as the earth when properly treated; rob it of its dues, and it will rob you of its products.

The other day a friend of mine wrote to me asking for written information how to prune his trees. I replied: "If you will call upon me the next time you are in town I could teach you more in half-an-hour by practical demonstrations than I could in a whole mailbag of letters." This is another matter that could be explained and illustrated at the monthly meetings of societies.

Insect pest is another very troublesome matter that could be dealt with. There are a great number of remedies now being used by various growers, but I believe that, if a vote were taken, the majority would be for Paris Green or London Purple as the best for all purposes. I wish here to give a warning note to those who are using, or who intend to use, them for spraying. The mouth and nostrils should be covered up, so that none of them is inhaled, as they are exceedingly injurious to health.

There are a number of other matters, such as the seasons, rotation of crops, &c., that could be discussed at these meetings.

Of late years the State school authorities have introduced a day set apart to plant trees to ornament their playgrounds, called "Arbor day." This opportunity could be made the means of imparting to the children not only the proper method of planting trees or shrubs, but I would go further and urge the necessity of having a plot of ground set apart to be cultivated by the children themselves.

This would engage their attention and develop in them habits of usefulness, diligence, and observation which would be the basis of future instruction, and if encouraged by societies would be the means of making many a home attractive to themselves, their families, and the district generally.

It is well known the height of the young Australian's ambition is to possess a horse, and his love for that animal is most remarkable. Could not something be done to induce him to give some of that love to horticulture? I am of opinion that a farm or cottage could be made more attractive if an effort were made by their parents to instil into their sons and daughters a love for growing plants, and that would draw their attention to greater things and help to keep them at home. It should be every parent's ambition to improve and beautify it and surround it with every comfort within his reach. I am speaking in this strain because it was under similar circumstances to the above that I got a start.

My parents gave me a small piece of ground, and in a very short time I had it overcrowded. I have learnt many a lesson since that time, and I always look back upon those days with pleasure, as it was the means of giving me a love for horticulture.

Some of you may think these are small and trivial matters to bring before a Conference. I do not think so myself, and therefore do not offer any apology, as I have seen very successful men make mistakes in smaller matters than I have dealt with. For instance, I can well remember laying out a garden at Gympie, and, as I am always of the opinion that a bed of herbs is the first thing to be planted, I did so in this case. In a day or two a gentleman paid a visit to the garden, and told my employer that he thought I should have known better than to plant sage by cuttings, as they would not grow.

Gentlemen, this man was a most successful farmer at the head of the Mary River, and a man whose opinion I value very much, and often I have had long conversations with him on farming matters in general, yet in a small matter of this kind he said it could not be done.

This is another thing the societies could remedy. Trusting some of the societies will proceed on the lines indicated here, I feel convinced they will benefit the small tillers of the soil in this State.

Mr. PETER McLEAN then read the following essay:—

CHAMBER OF AGRICULTURE.

[By WILL McILWRAITH, of the Rockhampton Agricultural Society.]

That, in the opinion of this Conference, the organisation of all persons engaged in arable agriculture and rural husbandry being desirable, it be remitted to the Business Committee to consider and prepare a scheme by which the same may be accomplished.

Before speaking to the motion of which I have given notice, and submitting it to the acceptance of this Conference, I desire to be permitted to call attention to what has already been done in this matter of the organisation of arable agriculture in Queensland, and to express my admiration and appreciation of the efforts made to promote it by the Government. The first Conference of which I have any record, was held in Brisbane on the 21st, 22nd, and 23rd August. 1889. It was held in the rooms of the National, Agricultural, and Industrial Association, and was in connection with the Exhibition held at that time. The sessions at that Conference were short, and nearly all the papers were read by gentlemen connected with the Department of Agriculture. Mr. H. M. Black was then Minister for Agriculture An Agricultural Conference under the direction of the Wide Bay and Burnett Pastoral and Agricultural Society was held in the Agricultural Hall, Maryborough, on the 15th and 16th January, 1891; under the auspices of the Rockhampton Agricultural and Pastoral Society, in the School of Arts, Rockhampton, on the 12th and 13th of May; and at Bundaberg, in the Municipal Chambers, on the 19th and 20th. In 1892, Agricultural Conferences were held, under the direction of the Agricultural and Pastoral Society of Southern Queensland, on the 9th and 10th of May, at Beenleigh; at Bundaberg, under the auspices of the Agricultural Society, on the 21st and 22nd of July; at Rockhampton, under the auspices of the Agricultural Society, on the 15th and 16th August; and at Mackay on the 23rd and 24th September. Though ostensibly under the auspices of the local societies, these meetings were largely assisted and encouraged by the Government. Records of the proceedings at them were issued as bulletins, and will be found useful for information and reference. The holding of Conferences lapsed for a few years, but in 1897, at the invitation of the Minister for Agriculture, the Hon A. J. Thynne, a conference of delegates was held at Gatton Agricultural College on the 10th, 11th, and 12th June, 1897. Conferences were afterwards held at Rockhampton in 1898; Mackay, in 1899; and Town Hall, Warwick, in 1900. The arrangements for these Conferences have been to a large extent in the hands of the Agricultural Department, and you are aware, gentlemen, of the success which has attended the gatherings. That they were not more popular was no fault of the Agricultural Department: it deserves well of those engaged

in our productive industries. In the motion which I put before the meeting I ask the Conference to express the opinion that the organisation of persons engaged in arable agriculture and rural industries is desirable. I do not anticipate there will be any difference of opinion on this point. In bringing this subject before the members of the Rockhampton Agricultural Society I pointed out the various ways and for what purposes the producers of other countries have associated themselves. Having furnished the Agricultural Societies of Queensland with reports of my remarks on that occasion, I do not consider I should trespass on your time by repeating them now. It has been remarked that the amalgamating influences of these Conferences are very slight. Gentlemen come here from all parts of the colony, and discuss subjects of social, economic, and material interest to farmers, but they take no decided action in regard to them. It may be asked, Who is to take action when the Conference is over? The Committee of Resolutions at the last Conference, "having duly considered the question of Government assistance to farmers, begged leave to recommend that a Bill be introduced into Parliament making provisions for affording financial assistance to agriculturists on such lines as may be considered suitable by the Government." That resolution was carried. It does not appear who was to prepare the Bill, and who was to engineer its introduction and approbation by Parliament? This absence of duty and responsibility arises from want of organisation in connection with the agricultural industry. I propose that the Business Committee of this Conference consider and prepare a scheme which would promote practical and permanent union among the farmers of Queensland. What form the organisation should assume, what are the objects it should seek to accomplish, and how it should essay to realise these, I will leave to the Committee to consider, and, if they think proper, to determine. In discussing the matter with my fellow-members in the Rockhampton Agricultural Society, I suggested that the combination should take the form of a Chamber of Agriculture with branches in all parts of the State. We have a sort of precedent for this proceeding in the constitution of an Australian Chamber of Commerce, to which the Chambers in all the States have the privilege of sending delegates or representatives. I am in favour of the formation of a Chamber of Agriculture, because, by that means, agriculturists all over Queensland might be united into a large and useful association. Our Chambers of Commerce have for their aims the promotion and protection of the commerce of the country, and of all the interests connected with it. They seek to accomplish these purposes by considering and discussing all questions connected with trade, commerce, and manufactures, and by circulating information respecting those of Queensland and the locality with which each is connected. To accomplish similar objects in connection with the great agricultural industry, in all its branches, ought to be the chief aim of the Chamber of Agriculture and its branches. Chambers of Commerce are deliberative and educational. Having discussed a subject affecting the trade or commerce of the country, or of some district, they place upon record their opinions regarding it, and, through their local parliamentary representatives, have them submitted to authorities with whom it may be desired they should have weight. The Chamber of Agriculture and its branches should, in my opinion, be of a similar character; and its chief aims should be to give expression to the views of agriculturists on all matters in which they may be immediately interested, and the dissemination of accurate and reliable information regarding the practice of agriculture, &c., &c. Such are the character and aims of the Chamber of Agriculture in the United Kingdom and of similar institutions in other countries I think it not improbable that some members of this Conference may be desirous of forming a combination of an economic, mercantile, co-operative character. "Co-operation for Farmers" and illustrations of the advantages of co-operation have been brought under your notice, and, I doubt not, have received attention. The grangers of the United States will at once occur to many delegates. It was calculated that in 1871 there were 30,000 local granges in all the States

and territories of the American union, with a total membership of 2,500,000. Its chief mission was a temporary one, and has since been fulfilled. Strong combinations of farmers for the attainment of specific purposes exist in Europe, America, and Australia. The utility of most of these is not to be disputed. Co-operative companies and associations are formed for specific objects and on commercial bases. The Chamber of Agriculture I should like to see formed would be like the Bureau of Agriculture of South Australia. It consists of a central bureau of sixteen members chosen by the Government and agriculturists, and includes a chairman and secretary. Permanent officials of the Agricultural Department, such as Professors Lowrie and Perkins, are members of it. Meetings are held monthly, and in the year ending the 30th June, 1900, it arranged for the Agricultural Congress at Adelaide, and for meetings of branch conferences at seven different places. It sent out seeds and manures for experimental purposes at schools; collected and disseminated information about the wheat harvest, the use of fertilisers, the improvement of stock, the dairying industry, forestry, horticulture, and viticulture, animal pests, winter irrigation, and agricultural education. The conferences arranged are for the benefit of members of branch bureaux in particular localities. Related to the Central Bureau are branch bureaux composed of twelve or more members These branch bureaux meet monthly, and members read papers and discuss matters of general and particular interest to themselves. Last year 273 papers were read at bureau meetings, and the best of these are published in the *Journal of Agriculture*. These branch bureaux are asked by the Central Bureau to express their opinion on questions which come up from time to time, such as taxing stallions, &c. They also have the privilege of submitting questions for the consideration of the Central Bureau. In the *Journal of Agriculture* of South Australia, May issue, I find numerous reports on the results of experiments with wheat and fertilisers; and notes on pickling wheat, and on bunt; these are the actual observations of practical men. The branch bureaux, in order to maintain their connection with the Central Bureau, have to hold a certain number of meetings annually and give evidence of their vitality and utility. A meeting of the Farmers and Settlers' Association of New South Wales is being held this week at Tamworth. Among the subjects to be discussed are:—1. Land questions 2. Rabbit question. 3. State Loan Bank. 4. Development of export trade of wheat aud other produce. 5. Railways. 6. Local Government Bill. 7. Water conservation. 8. Stock Acts and routes. 9. Best means of extending the usefulness of the association. I submit that an expression of opinion on any of these subjects from a hundred or more branch bureaux would be of more value than that of a conference of delegates. The proposal for the formation of a Chamber of Agriculture in Queensland should commend itself to members of this Conference, because it need not mean a separation of the union which has existed between the Agricultural Department and farmers' societies. The central chamber could be formed in Brisbane, and could be constituted to command the confidence and respect of agriculturists. There already exist in the colony many societies of which it would only be necessary to change the name to make them branch chambers. By promoting the formation of such branches, and submitting subjects for their discussion, a great stimulus would be given to intellectual activity among our rural population. The organisation of farmers, accomplished for the purposes and in the way suggested, might be made useful in other ways and directions. Enough has been said, I hope, to secure for the resolution I propose, the approval of the Conference.

DISCUSSION ON THE THREE PRECEDING PAPERS.

The Hon. ANGUS GIBSON, M.L.C. (Bingera): The subject of organisation among farmers is an interesting one to every gentleman present. A great deal has been said in the papers of what has been done in America and other parts of the world, but a more important point is: What have we been doing in Queensland in this direction? I think we have now in this room that which

might be an object lesson even to America. But, coming still nearer home, I may say that for a number of years we have been endeavouring to organise in the Bundaberg district, and, I think, our efforts have not been without result. We have some eight or ten district societies under various names, but, generally speaking, one object—that of the advancement of the district which we are now in. For the outside places we determined that we should have one central head, and we have now in Bundaberg a council of agriculture conducted by gentlemen selected by the outside districts. We have met and talked over grave matters connected with the interests of different branches of agriculture. One of these was, what could be done for the advancement of the sugar industry. We made out plans and propounded a scheme which was handed to the Minister for Agriculture, showing how it was possible to get a capable gentleman to this State, and how we could pay his salary when he arrived here. We fought the matter out both publicly and privately, and we proved to Queensland that there was a possibility of getting a sugar expert from a country where he had been signally successful. We showed how this could be done, and many of you gentlemen here know how difficult it was for us to arrive at a scheme to which we could all agree. I suppose we could not have agreed had not the conclusion been forced upon us that unless something was done the cane itself would leave us. The result was, that we were able to place upon our parliamentary records this fact, that the Bundaberg organisation had done something for the betterment, we trust, of the sugar industry of Queensland. I feel sure, moreover, that there is a broader and wider principle upon which we could work. When we look at the gathering here to-night, it is difficult to see any reason why we should not organise, and become a mighty power in the State for the advancement of agriculture. It rests with ourselves. There is no necessity for our being divided against each other—the North against the South or the South against the Central. Let us amalgamate, and we shall have more than one Minister in our Cabinet, and more than one set of gentlemen representing us in the Assembly.

Mr. T. DE M. MURRAY-PRIOR (Maroon): Mr. Deacon has struck the right note in the title of his paper, and that is—organisation among farmers. The Government have shown what can be done in this direction by calling us together from every part of Queensland, and there is no gathering at which this matter could be better discussed than the present. We must organise if we mean to progress. We are representatives of the producing industries that are the backbone of the country, and if we want those industries to go ahead it is necessary that we organise. I think myself that the best way to organise is for the societies here represented to mutually co-operate, and assist each other by delegates from their meeting each year, in the manner suggested by Mr. McIlwraith. Let us have a chamber of agriculture, or, rather, a chamber of producers.

Mr. A. MOFFAT (Radford): This chamber of agriculture is a grand idea. It will, of course, be for the sake of gaining information with regard to statistics and spreading it amongst us. It will also be for the purpose of getting seeds for us to experiment with. This chamber, to be a thorough success, however, should be under State control, and, so far as I can see, we already have a chamber of agriculture. Surely we should give the Agricultural Department, which is practically everything that the suggested chamber of agriculture would be, a little show. Let us see what this Agricultural Department is going to develop into. It has done good work, and I have faith that it will do better in the future. I do not wish to say anything to discourage this proposed chamber, but I must confess that I think it seems a bit of a fad.

Mr. LESLIE G. CORRIE (Brisbane): I think Mr. Moffat has a little lost the intention of the writers of the papers—of two of them at least. The subject can be divided a little. If you tackle purely educational work, of course the Agricultural Department is the most qualified to conduct that, and the

Department does conduct it. But if you wish to go further, if you wish to have the producers organised, so that they may be a power in the State, then that can hardly be done by having an organisation at the head of which is a Government department. Such an organisation, for instance, could hardly take any action in the securing of seats in Parliament. I agree with what Mr. McIlwraith has said about the South Australian Bureau of Agriculture, about the working of which I know a little. By its constitution the South Australian Agricultural Bureau has its finger upon the agricultural pulse of the State. The branch bureaus arrange monthly meetings, reports of which are sent to the central bureau; they answer questions sent by the central bureau, and altogether this latter body is able to embody in its monthly journal an amount of information of the greatest value to the farming community of South Australia. Of course when you come to the question of making the farmers a power in the land, as they ought to be, we are brought face to face with the fact that in Queensland, although we have a great many organisations, yet we have no proper general organisation for the whole of the State. Until we get that, we cannot act with power. A lot of scattered associations will never be a power in the land until they are properly organised. There is room in a chamber of agriculture to do both work of the nature pointed out by Mr. Gibson, and also from an educational standpoint such an organisation of our societies would result in greater good.

Mr. W. EWART (Brisbane): Being one of the representatives of the Queensland Horticultural Society, I may say that I fully agree with the suggestion that horticulture could be introduced to relieve much of the dreary side of the producer's life. With reference to monthly shows, I may say that I have with me the business-paper of the horticultural society's meeting which is to be held in Brisbane to-night. The chief item is the reading of a paper on native wild flowers by the president, the Hon. Albert Norton, M.L.C., but in addition there are a number of prize competitions. We have these latter every month, and always endeavour to give at each meeting six small prizes—two for flowers that will be out at the time, two for vegetables, and two for fruit. The competition for to-night will be for six roses, six narcissus, six oranges, six mandarins, six dishes of peas, and the prize in each case is half-a-crown. These prizes, although perhaps small, still induce a great deal of competition, and also induce people to improve their methods of growing vegetables, flowers, &c. Mr. Davies made reference to the teaching of horticulture in schools, and I may state that our society last year sent round circulars to all the metropolitan schools, and offered prizes for garden plots taken care of by the children. Judges were appointed by the society, and these went round and awarded the prizes. It was not a very extensive competition, the public school grounds of the State being not too well adapted to the growing of flowers, but still the society was satisfied their action would not be without effect. There is one matter that might well be taken up by some leading society or by some committee formed for the purpose, and that is, the nomenclature of varieties. In Queensland a great many flowers and fruits are brought forward every year, but there is no proper authority to see that they are correctly named. This is a matter that really should be taken up by some influential association. Our society, apparently like all others, suffers chiefly from want of public support. If the public would only support them better, it would be more encouraging to the few enthusiasts who really carry out the work of the societies.

Mr. J. W. LEE (Zillmere): The topics that have been discussed in the three papers read, reduce themselves to one word, and that is—organisation. I have had something to do with organisation among farmers for thirty years in Queensland, and understand the difficulties connected with it. If we can have in our country districts, however, a co-operation of societies, such as Mr. Gibson says they have in Bundaberg, then I think there would be no question as to the value of a chamber of agriculture. But until we have united action amongst the different districts, and considering the apathy that is so often shown on the subject at

present by farmers, it is doubtful whether it would be advisable to at once take the steps advised in Mr. McIlwraith's paper. In my association we have about seventy or eighty members, but if we call a meeting to deal with some matter of vital importance we are lucky if we get an attendance of more than five or six. While such a state of things exist—and our experience is not uncommon—it is hard to see how we are to get farmers to look after their own interests. A chamber of agriculture could not possibly exist while such a spirit of indifference is prevalent. What we want to do is to break down that jealousy that is, unfortunately, so common amongst the farming community. One gentleman has suggested that we exhibit our products one to another, that those of us who grow good articles of some particular kind should bring specimens to periodical meetings to show what could be done in the district, and at the same time open up an avenue for making the meetings educational by telling how the specimens were grown. As a matter of fact, however, such a spirit does not exist amongst the horticulturists of the present day, at any rate, so far as my experience goes. If they grow anything good they want to keep it to themselves. They will not tell their own finger ends how they grew it. A gardener produces a good rose, but, upon being asked its name, the only information he will vouchsafe is, that it is a "speciality." It is the same with a man who produces a new orange. It is also a "speciality," and that is all the information that can be elicited concerning it. Until this niggardly feeling that exists—and we all know that it does exist—is done away with, there is not much hope for a general organisation of farmers attaining any practical dimensions.

MR. THOS. BINNIE (Cairns): We have heard the different opinions expressed as to the value of organisation, but one gentleman rather pleased me by saying we could leave a good deal of the matter proposed to be dealt with by the chamber of agriculture, to the Department of Agriculture. The Government already subsidises agricultural societies, and all these movements should be made through the societies. We in the North are not in a position to be able to hold meetings every month. We do hold one every year, and I consider that the friendly rivalry then inculcated is one of the best methods of encouraging and improving agriculture. The last speaker referred to the case of a man who grew a very good rose, but would divulge no information as to its name or how it was grown. If he exhibits it at a show, however, the difficulty is easily got over by making him, if the rose takes a prize, state what it is. These friendly rivalries are a means of organisation. I think it would be unwise to introduce politics into any organisations that we may have, because even as farmers, we all have our differences in politics. The main thing, I think, is to have our eyes directed towards pounds, shillings, and pence, and to consign politics to perdition. What is now wanted is to give our agricultural societies a better standing. Myself and my colleague here to-night, Mr. Mayers, are at present the only two farmers in the Cairns Agricultural, Pastoral, and Mining Association, and that is the state of many of the societies up North. Indeed it may be wondered how farmers are to expect organisation if they will not support the societies now in existence.

MR. W. R. ROBINSON (Toowoomba): I have listened attentively to the papers read, and may say that I have had some little experience of show matters on the Darling Downs. Many of the matters brought forward in the papers are very good in theory, but difficult in practice. It appears that in the Northern parts of the State the sugar-growers can combine in their own interests much sooner than the farmers who grow mixed crops on the Darling Downs. The society I represent has, on many occasions, engaged a hall, got good men to read first-class papers, and, in addition, well advertised the meeting, and yet you would not get three farmers to turn up to it. Undoubtedly, if we could organise and carry out a lot of the things suggested, it would be productive of much good, but the difficulty is to get the farmers to join in. The only way to get them to come to some meetings is to send a horse and cart for them. In looking after their own interests farmers seem to be the slowest class

of men. The Agricultural Department is doing wonderfully good work; and if the farmers choose to avail themselves of the seeds and information distributed by the Department, they can get them with very little trouble. As for the question of small shows, my experience is that, generally, nearly every exhibitor gets a prize, and consequently any honour that may attach to winning one is more or less, reduced to a minimum. In fact, if every farmer does not get an award, the disappointed ones will go and start a show of their own the following year.

Mr. W. P. COOKSLEY (Brisbane): My experience of horticultural societies is that the attendance at meetings is generally very limited. Members, as a rule, do not care about turning out at night. This is not altogether the fault of the members, but owing to the dates on which the meetings are held. If more favourable dates were chosen for meetings, more members would probably turn up. I think a chamber of agriculture is necessary. We have a live Department, but it does not see everything that is required. A chamber is wanted altogether separate from the Department, and in no wise governed by it. It should be rather of the nature of an advisory body to the Department. If a chamber had been in existence during the past two years, the fruit-growing industry would probably not have suffered in the way that it has. I would suggest that the delegates to this Conference discuss the matter of forming a chamber, for I certainly think that one is needed.

Mr. PERCY BIDDLES (Tiaro): It appears to me the meeting has not properly grasped Mr. Deacon's paper. He outlines a trust, which the people of Queensland should hold as a trust. We have trusts in America which are simply organisations, and these not merely enrich themselves, but those beneath them. Not only that, but by our trust, the farmers of the South would become more in sympathy with those of the North. Why should not the grower of corn have sympathy with the grower of cane? Why should not the grower of the Downs be in sympathy with the Mackay sugar planter? Let us, if we can, join together and fight our battle in that trust for the rural interests of Queensland; not only ourselves, but the people who make their living out of us. I certainly think that what Mr. Deacon has suggested—namely, a chamber of agriculture—is one of the finest things we could possibly adopt. It would not only be a benefit to ourselves, but a benefit to Queensland. The Southern people would then be able to drop into the views of the Northern. The Government frequently want advice relative to the different conditions of different districts; and an independent chamber of agriculture would be of the greatest service in that way. The lands of the North, for instance, are frequently different in their conditions from those of the South, with the result that the same land laws are hardly applicable to both.

Mr. F. W. PEEK (Loganholme): As the organiser of one of the most successful associations of the State—namely, the Logan Farming and Industrial Association—I may say that we claim to have done a little amount of good. There is one thing we brought forward very prominently lately, and that was rice. Rice had been tried in the Logan previous to the formation of our association, but unfortunately the business had been allowed to lapse for the want of the matter being properly taken up and grown by a recognised body of farmers. Each man had been paddling his own canoe, had been fossicking along by purchasing seed here, there, and everywhere. He had, in some instances, got hold of the wrong sample of seed, and the rice industry, which had been started by our friend of the *Agricultural Journal*, Major A. J. Boyd, some twenty-three years ago, had fallen into decay, although the Logan district is really one of the best situated in the State for the growth of rice. In the Logan there are a large number of swamps, which have been to a certain extent drained, however, and this land contains the constituents of what the rice requires. The land had, at one time, evidently been overflown by the sea, leaving a deposit of lime, sea shells, &c., on which, together with certain saline properties, the rice seems to find that nourishment on which it thrives. The farmers in the district did, as a matter of fact, grow a quantity of rice for feeding to horses, but our

association thought the industry could be turned to better account. We accordingly applied to the Department of Agriculture for information as to what could be done with the rice then under crop, and we were referred to Messrs. Robert Harper and Co., of Brisbane. This firm made us an offer of from £7 to £7 10s. per ton for the paddy. I may here state that the seed originally introduced by Major Boyd had been allowed to deteriorate, so we took steps, again with the assistance of the Agricultural Department, to get seed of good varieties. We went still further, and have had a co-operative mill erected at Pimpama, with the result that the rice industry is now well established, on what appears to be the right lines, in the Logan district.

Mr. T. W. CRAWFORD (Mosman): It seems to me that all present are agreed upon as to the advisability of organisation. On looking at the programme I find there are representatives present from about eighty to 100 societies, which proves that the agricultural industry is, in a sense, pretty well organised. That organisation, however, is not complete. For one week in every year, it may be said that the agricultural industry has a complete organisation, but for the remaining fifty-one weeks we are, to a certain degree, disorganised. I trust we will be able to agree to some practical scheme to give effect to the opinions expressed here to-night, and what I would suggest is the appointment of an executive committee which will be representative of the industry throughout the State. If this is done, whenever an emergency arises we shall have the necessary organisation to deal with it.

Mr. T. E. COULSON (Rosewood): There is not the slightest doubt but that the farming community is the worst organised in the State. Nearly every other trade and section organise for their own interests. There is truth in Mr. Lee's statement that there is a certain amount of petty jealousy amongst farmers, which keeps them from organising. As for the suggested Chamber of Agriculture, I would be glad to hear what are to be its functions. I take it that one of them is to place the products of the State upon a proper market. I remember at a previous Conference, a committee was appointed to draw up a plan for the distribution of our produce and for the supplying of articles that we required. This executive was to be in Brisbane, or some other central place where we might be appointed to meet. The committee had hardly been formed, however, before I came to the idea that the scheme was impracticable. There was Mr. Swayne at Mackay, myself at Rosewood, and so on; so I did not see how the committee were ever going to be able to meet together. I have worked as hard as any man for the organisation and good of farmers, and my experience is that you will generally get more kicks than ha'pence for your pains. Mr. Robinson states that all the competitors get prizes at the small country shows. If he comes to the next Rosewood show, I can promise him the sight of plenty of exhibitors going away with long faces.

Mr. T. BURGESS (Forest Hill): It is hard to know why in the name of common sense farmers come here to run themselves down. I am a farmer, and am proud of it. I am not going to make reference to a lot that has been said, except that a lot of it had better have been left unsaid. The question of organisation is an immense one, but the farmers recognise its value as much as any one. But there are difficulties connected with the organisation of farmers which probably do not beset any other calling in life. Look at our surroundings, at the distances and roads over which we have to travel, and compare them with the surroundings of many of our commercial classes. You will then get some idea of why farmers do not organise. I do not deny that there is a lot of indifference shown amongst our farmers on this question, but are we going to give up trying to bring ourselves together because the way to success and the way to union are beset with difficulty? Not a bit of fear. Rome was not built in a day, and farmers are not going to be organised in a day. But the organisation is coming, and one of the best evidences we have is the splendid gathering of farming representatives that we have here to-night. Many have travelled hundreds of miles to attend this Conference, and the way to success.

in organisation is in agitation. It is by constantly putting before our producers the need of standing shoulder to shoulder in their own interests. I do not believe there is a bit of ill-feeling existing in the North against the South, or in the South against the North. We recognise that we are brother farmers—that what benefits the North benefits the South. The time is coming when organisation among farmers will be as complete as among commercial men, and this chamber of agriculture will assuredly come. This is as sure as we are living, and as sure as earnest men put their shoulders to the wheel, so surely will this chamber of agriculture become an accomplished fact, and farmers as men, take their rightful place, which is the first place, in the world.

Mr. C. Atthow (Brisbane): As the last speaker indicated, it is not only organisation, but agitation that is wanted. Why should we organise? Simply because if we want anything good we must organise, and we must also agitate. I am sorry that one gentleman thought this proposal of a chamber of agriculture was antagonistic to the Department of Agriculture. It is no such thing.

Mr. Moffat: Premature, not antagonistic.

Mr. Atthow: I do not think that what has been advocated is antagonistic to the Department of Agriculture. As for its probable success, we know it is very difficult to get producers to combine. I once tried, with a number of others, to get the fruit industry better organised. We had a central association and a number of smaller ones in the outside districts; but when we came to ask these latter to send in a contribution to cover advertising and rents for meeting places, they at once withdrew and left us. And so it will ever be, I suppose. To get real organisation you must show that there is going to be some profit in it. If you can show a definite benefit in organisation, then the producer will organise. As Mr. Gibson has said, let us look about us and see what we can do. Certainly, if we organise a centre in Brisbane we would be near the parliamentary men and be near the Minister for Agriculture. Then we would have a means by which we could agitate. A request could be sent down to Brisbane, and the necessary agitation could be done by the combination at hand. Take the citrus fruits, concerning which a deputation interviewed the Minister some time back. I do not suppose there was a single fruitgrower there, but within two minutes the difficulties they were labouring under in this particular instance were removed. So on these lines it would be seen that a chamber of agriculture would be of material assistance to the industry. Take the question of freights again. If there were a proper body in Brisbane, the difficulties that are always cropping up in this connection could be dealt with without any loss of time or worry.

The Hon. D. H. Dalrymple: It is nearly a quarter past 10, and I understand it has been the custom hitherto to adjourn about this time, and it seems to be your wish that this custom should be adhered to. I believe it has also been the custom for the Chairman to sum up the discussions that take place on the papers from time to time, but really it seems that in a way the present discussion has already been summed up very happily. It appears to me quite clear that there is a consensus in favour of a union, and I do not think this is astonishing when we consider that if you want to exercise power —it does not matter in what direction—you must act, as far as you can, as one. Taking it for granted that the meeting has affirmed to-night that it is in favour of union, I cannot conceive a more favourable opportunity of getting at the details of how this union is to be brought about than the present. It cannot be brought about without trouble. I am not guilty of flattery when I say there are present a number of intelligent men. There are a number of gentlemen here who have to-night said they are familiar with organisation, and among them Mr. Gibson, who has told us how he had conducted an organisation for the benefit of the sugar industry. In men like Mr. Gibson and Mr. Swayne you really have the head centres of organisation in Queensland at this Conference, and with their help some practicable plan may be devised to enable you to act

more in concert than at present. I recognise the peculiar circumstances of farmers pointed out in the very impressive speech of Mr. Burgess. It is not very difficult to get a number of shop assistants to organise. They have, perhaps, only a quarter of a mile to travel to their meeting place. It is the same with artisans. They work together, and it is therefore easy for them to organise. Even admitting, however, that farmers have to encounter greater difficulties in this connection, still those difficulties are surmounted in other parts of the world, and it would be a slur upon your determination and upon your intelligence, if the formation of a closer union were thought beneficial, to imagine that you could not bring it about. I for my part believe you can do it.

Mr. W. DEACON (Allora): I have no wish to make any further remarks on the general subject of organisation, but, with reference to what Mr. Robinson said about small shows. I may say that I still adhere to it that small shows are valuable, and that they very often have far better exhibits than the larger ones. Mr. Robinson speaks of his experience as a judge, but at our shows he only judged the horses, and I do not think he knew much about the other exhibits. Last year was a bad year, but I put in several things which did not secure prizes.

Mr. JOHN DAVIES (Gympie): I thank you for the manner and sympathy with which you received my paper.

SECOND SESSION.

WEDNESDAY, 12TH JUNE, 1901, 9·30 A.M.

Proceedings were commenced by the reading of a letter from Mr. K. Nahrung, of Miva, relative to the desirability of the introduction of legislation to check the sale of valueless seeds.

On the motion of Mr. P. McLEAN, seconded by Mr. L. G. CORRIE, the letter was referred to the Committee of Resolutions.

Mr. J. WILSON, of Freestone Creek, Warwick, then read the following paper on—

HOW FEDERATION UNDER CERTAIN CONDITIONS IS LIKELY TO AFFECT QUEENSLAND FARMERS.

As one of the delegates from the Eastern Downs Horticultural and Agricultural Society, Warwick, I may say that I am pleased to have this opportunity of again meeting some of those gentlemen who attended the first Agricultural Conference at the opening of the Gatton College. I should also like to take this opportunity of congratulating the officers of the Agricultural Department on the very valuable information that their monthly *Journal* from time to time gives to our State producers, and the able manner in which anything likely to advance the interests of our State is put before its readers. It is a credit to the editor and all concerned. I am sure that all the readers of the *Agricultural Journal*, whether they like it or not, will be forced to acknowledge that in order to be able to successfully compete in the world's markets scientific farming must be adopted here the same as elsewhere; and the training given to our young men in the College must in the near future bring in good returns for the money spent by the State thereon.

In the course of this paper I shall endeavour to answer the following questions:—(1), "What effect will Federation have on the producing industry of our State?" and (2), "Shall we be able to compete with the older States when our protective tariffs are taken off?" Queensland at present grows nearly enough sugar to supply the whole of United Australia, raises three-fourths of the cattle in Australia, and has sufficient land cleared for the plough to grow breadstuffs for all the States. She also has an enormous wealth of minerals, as well as the deposits of coal close to our seaports necessary to enable manufacturers to commence operations in our State, which they undoubtedly will in a short time. All things being equal, I am not afraid of the competition which we will have to face, provided our Government will put us on the same footing with regard to railway transport for our produce as our competitors in New South Wales.

I see by the reports of the Federal Parliament that one of our most important industries—that of sugar—is threatened with hasty legislation to bring about the abolition of kanaka traffic. As I have no personal knowledge of the subject, I am not prepared to speak authoritatively on this question, but judging by the correspondence in the Press on this subject I think that it would be very unwise for the Federal Parliament to attempt to decide an important question like this without investigating fully the merits of the case. I think a resolution should be passed by this Conference asking the Federal Government to appoint a Royal Commission to take evidence on the plantations with regard to this important question, and report to both Houses of the Federal Government before any legislation on the matter is initiated.

Now, to come to the question which materially affects the producers in the Southern part of Queensland: I refer to the equalising of our railway rates with the rates now in force in New South Wales. The Federal Parliament appears to be of the opinion that the sooner the Customs tariffs between the States are removed the better it will be for all concerned. At present the following duties are in operation in Queensland against imported produce:—£1 per ton on flour; 15s. per ton on hay, chaff, and potatoes; 8d. per bushel on maize; 4d. per bushel on wheat; 9d. per bushel on Cape barley; 1s. 6d. per bushel on malting barley; pollard and bran, 4d. per bushel; malt, 4s. 6d. per bushel. The protective duty in each case will be taken off between the States on the introduction of the Federal tariff.

I shall now give comparisons between the New South Wales railway rates and Queensland railway rates on some of our most important products. For instance, take from Killarney to Gladstone, a distance of 500 miles. The comparative rates are—

	Queensland.			N.S.W.	
	£	s.	d.	s.	d.
Hay and chaff, per ton	1	12	6	12	6
Wheat and maize, per ton	1	7	6	14	0

From Warwick to Bundaberg, a distance of 371 miles, the comparative rates are—

Flour, per ton	1	2	2	13	0
Hay and chaff, per ton	1	6	4	13	0

From Warwick to Maryborough, a distance of 321 miles:—

Wheat and maize, per ton	1	0	1	11	6

From Warwick to Gympie, a distance of 261 miles:—

Flour, per ton...	2	17	3	12	3
Hay and chaff, per ton	1	0	9	9	2

From Warwick to Brisbane, a distance of 154 miles:—

Hay and chaff, per ton		14	8	6	8

(The above are for truck loads to port.)

With the excessive railway rates now in force in this State, and the low railway rates in New South Wales and low water carriage from the other States to our ports (where the bulk of our consumers are located), it will be impossible, unless our rates are assimilated with those of New South Wales, for our farmers to successfully compete with the imports of the other States, or even to make a living on their holdings.

In conclusion, I should like to suggest that a resolution be passed by this Conference and forwarded to the Queensland Government, pointing out the disabilities which will threaten the farmers of Southern Queensland when the protective duties are removed, and asking them to assimilate our railway rates with those of New South Wales.

The following was the next paper read:—

THE DIFFERENTIAL RAILWAY FREIGHTS FROM A FARMER'S POINT OF VIEW.

[By J. J. Daniel, Pittsworth.]

I would like to preface this paper by saying it is not written so much to give as to get information, thinking that, now and here, where the wisdom of so many of our industries is concentrated, would be a good time to get light that would help not only legislation but also those who are interested. I deal only with the facts that there is a difference on the rate of wheat and flour, and that farmers are being asked to protest. The difficulty in dealing with this grievance must be the same as any Government

finds in framing laws, making regulations, or drawing up a scale of rates to suit men who, while calling themselves farmers, have interests in so many things that have to be dealt with under other heads, often being adverse to the farmer's interest. When a farmer, who is by nature a producer, becomes a buyer, a miller, and consumer, there must needs be a little difficulty in providing even rates where each interest shall receive its just due. One of the first charges upon a Government is to place its land so that it can be utilised and will give the best account of itself; this is done by settling people upon it who, in every respect, shall increase the power of the State by increasing its population, providing for its wants, and in other ways contributing to its revenue. Next, that Government should, in every way, make the transit of its production so easy and cheap that, as raw material, it can be placed with advantage on our markets, thus ensuring the attention of all buyers. I am not one of those beings who can never see good in action or intent in what is done by a Government to whom I may be opposed. I believe that at the heads of our departments we have men who seek to work them for the public good as well as for the increase of revenue. With respect to our wheat industry I have given them the credit of carrying it at as low a rate as possible, barely on the paying side, for the sake of helping us as producers. If, as such, we are satisfied with the rate of carriage, what have we to do with its transit after it is manufactured? Why farmers should be turning the State upside down by petitions and letters, all headed "Farmers' Grievance," because the rate on flour is high, I cannot tell. The Government say, "We will carry your wheat at almost a loss, but when it is manufactured we must make that loss good by increasing that rate, and its burden will be borne by the consumer, who is everyone." The farmer cannot fail to see his advantage. The low rate for wheat opens every market. He has the advantage of sending away hundreds of bags of wheat at a low rate, and pays the increased rate only on the ten or twenty bags of flour as a consumer. If there is a grievance, as a consumer he must stand on the same level as others. As to the rate on flour, that belongs to the miller, or, more particularly, to the consumer. It cannot be the producer's. The petition presented to the Acting Premier said: "If the rate on flour were reduced, the Warwick farmers would get 5d. per bushel more for their wheat." This is questionable. We admit it would allow the miller to place it, say, at Toowoomba at so much less, but we are inclined to believe the shareholders would want the extra profit to put machinery in better order or to reduce overdraft, &c. Local mills do not give more for wheat than the buyers from a distance. Then, again, it says, "Why should Toowoomba be made a dumping-ground for Warwick wheat, thus robbing the farmers of Toowoomba of 7d. per bushel?" The petitioners would alter this by a reduction on the carriage of flour, and then Warwick can dump its flour on the Toowoomba market, and where will the farmer's benefit be then? This petition omitted one clause to have crowned such legislation for the farmer—viz., that a special rate be charged on all wheat being carried from centres of production where local flour-mills exist, thus helping those mills. For our industry we say, Let us rather have localised mills by a heavy rate on the flour than localised markets for our grain. The low rate for our wheat opens to us all the markets. If the rate on flour is lowered it will benefit all mills, and then those who have cheaper rates and can buy in larger markets will be better able to compete with our local mills, though we are producers. If our farmers will attend to the production and the Government carry it at the very lowest rates, then it will find its way into every mill in the State; for we yet have to learn to produce as cheaply as do others. The question is—Does the rate on flour belong to us as producers, or is it not rather the millers' and consumers'?

Our producers will not think; we are here to think for them, and to carry back to our centres our thoughts. As producers we have a power. The power is being used against our best interests; for to-day consumption is telling the producer how and at what rate he shall produce. We want to direct that power, so I would press for an opinion on this subject, that we can carry back not personal but collective decision.

DISCUSSION.

Mr. W. DEACON (Allora): I certainly was disinclined to speak at first, on account of the tangle which this subject appears to have got into. We should first of all eliminate all this talk about Warwick and Toowoomba. The people generally should consider the interest of the consumer—the interest of the people. When producers produce a large quantity of a given product it is the duty of the Legislature to get that product to the people who consume it. We produced in Allora and Warwick last year 630,000 bushels of wheat, or more than half that produced in the State. We cannot eat it all. All this talk about

discriminating protection should be done away with. Mr. Daniel says wheat is carried as low as possible. It is carried from Allora to Warwick at about 1d. per ton per mile. If he looks at the New South Wales rates he will find it is a little over half-a-penny per ton per mile. Cecil Rhodes, of South Africa, makes it a special merit in that large book of his, that he reduced the freight on flour, that is the manufactured article, on the railways in Cape Colony, to half-a-penny per ton per mile. If they can do it there they can do it here. Somehow or other the railways pay there. We are always told we must not lower the freights because the railways will not pay. I should like to be pointed out a country where the railways with high freights pay. It is very often low freights that pay by doubling and trebling the amount of produce that is carried through them. This subject has been brought up before. At Rockhampton we passed a resolution that the Government should be requested to reduce the rates on articles of produce to the level of those in New South Wales, but we never heard anything further of it. Mr. Daniel said it did not matter to us what the Government charged for flour. I think, however, that it would be best to charge the same rate for wheat as for flour, and that is what is done in New South Wales. When I advocated federation I thought if we had to compete with the other States that we would all be put upon the same level. As for the Warwick people sending their flour to intermediate towns between there and Brisbane, they simply cannot do it. In order to get the reduced rates, the flour has to be sent to a port, and from thence back to the intermediate town. I do not go with Mr. Wilson in this business about Roma. We do not care about the Roma market. What we want is to get to the people. We want cheap freights to Brisbane, to Bundaberg, and to every place on the route. You can send flour to Brisbane, and the freight will be 12s. 6d. If it goes to Gatton, however, you will have to pay about 17s. 6d.

Mr. Miscamble: We grow wheat in Roma and, like the people of Allora and Warwick, we cannot eat it all, even if we sat up all night to do it. We therefore have to find a market, and we naturally look to the West. But the people on the Darling Downs want to steal that market away from us, and have been trying to do so for the past five or six years. For some years they have been carrying wheat at a differential rate from Warwick to Cunnamulla. What I simply hold out for is cheap rates: cheap rates for the Darling Downs, if need be. We want no favours from anybody, but we do not want our market taken from us by a stroke of the pen of the Railway Commissioner. There is a great future for our industry in the Maranoa, and this year we will be sending wheat over the top of the Darling Downs. We will have to send to Brisbane. They will have to do likewise, and I ask them to look to the big population on the coast for the disposal of their surplus. I look on Brisbane as the gate of the country, and we want to meet our Southern competitors there. We do not want to meet them at the back. We can only meet them, however, by having cheap rates to the port, and therefore let our rates come down to the level of those of New South Wales and Victoria. If we cannot grow wheat in Queensland with fair rates, let us give it up. I, for one, do not think we will be beaten. I lived for twenty-five years in the wheat-growing areas of Victoria, and can say we have better land than Victoria. All we want is fairplay, and then we will have no fear of the result.

Mr. T. de M. Murray-Prior (Maroon): I would have liked to have seen a few more farmers speak on this subject, still, as I am a representative of a large agricultural district, a few remarks from me on this subject may not be out of place. I was a strong advocate for federation, but if federation is going to prove beneficial to Queensland we must have cheap freights to our ports, and our ports must be open. We, as a body of people, have a grand country, but unless our legislators look at things with a business-like view we shall go down in federation, and I must say that I was surprised at the figures that have been given here to-night by Mr. Wilson showing the differences in our railway freights. Unless our rates are brought down to the levels of the other States

we shall be brought down irrespective of our resources. If the people are doing well, then the railways will do well. If you kill the farmers, you kill the goose that lays the golden egg, and you kill the country.

Mr. J. WILSON (Freestone Creek): As for what Mr. Miscamble has said, I may say that we have never asked that our wheat be sent to Roma at a less rate than our flour. Mr. Miscamble wants Warwick wheat to be sent to Roma to be manufactured there into flour. We have the finest land on the face of the earth for wheat, but this year I have only 55 acres of land under the bread cereal. We are now being compelled to go in for hay and chaff, and are thereby encroaching upon the people at the foot of the Range. If we were allowed to grow wheat we would make our railways pay. I really think the Government does not know the position we are in. That poor unfortunate Pittsworth mill is 27 miles from Toowoomba. When it has to send a ton of flour into Toowoomba it costs them for railway freight 11s. 4d., although a ton of wheat goes in for 2s. 4d. I was at the first Agricultural Conference at Gatton, and before I came there looked upon you Northern men as enemies. After being cooped up together for four days, however, we got to know each other. And now, since I have been to Bundaberg, I may say that my eyes have been opened a good deal concerning this kanaka business.

Mr. J. DANIEL (Pittsworth): The reason I read my paper was because I thought an injustice had been put upon our farmers. Those who have read the petition from the Warwick Farmers' Milling Company, presented to the Acting Premier, will find that it bears this on its face: "We do not want the wheat to go from here; we would rather have a higher rate put upon our wheat. Take our flour cheap so that the wheat can go through our mill." I have looked through the petition and cannot see anything else in it. I take this from an outside view. I shall not quote any figures. My idea is that as soon as a farmer has produced his wheat and has placed that on the market, that as a producer he has done with that article. He is finished with it. In the carrying of it from the mill, however, he is in a different position. If he becomes a miller, then he wants it carried away at a cheaper rate. All the farmers are asking me: Are we to protest against the rate on flour? I am quite willing that it be carried at a cheap rate, but am not willing that the wheat be carried at a higher rate. In short, I am in favour of the wheat being carried at a low rate, and the flour too, for that matter.

The Hon. D. H. DALRYMPLE: The speakers have complained partly of the cost of removing flour, but they have shown to me, at any rate, that the whole question is an exceedingly difficult one, because there is a conflict of opinion between those gentlemen who have addressed you. There seems a conflict of interests—the interest of the miller, the interest of the farmer, the interest of the producer, and the interest of the consumer. Then there is the conflict of interests arising from local considerations. The views of the Warwick, the Pittsworth, the Toowoomba, and the Roma representatives on these matters seem to differ. That, I say, makes the question a very difficult one. For my part, I believe that the Commissioner does his best to deal fairly with all parties and with the State as a whole. It may be desirable, and no doubt is, that the railway rates should be very low, but we should remember, whether the railways are kept largely by the rates which are charged upon them or whether they are not kept in that way, they have got to be kept in some way. That is to say, the railway expenses have to be met, and you know that the railway revenue has fallen off £20,000 in consequence of the deficiency in carriage, and we know tho railways do not pay the interest on the cost of their construction to the extent of £500,000 per annum. Therefore the question is a very difficult one, and I am sure if any delegate found himself in the position of endeavouring to reconcile all these interests—the interest of the people who use them and the interest of the people who have to pay taxes—he would find himself in as difficult a position as the one now occupied by Mr. Leahy. We do not yet know how the volume of exchange will be affected when federation comes into

operation, but a good many results are bound to follow which we do not now foresee. We shall, doubtless, have meetings of the various Railway Commissioners in order to endeavour to adapt the railway systems to the exigencies of the States in their new condition of affairs. I am sanguine that everything will be done by those who are interested, to meet a very entangled problem, and, so far as possible, do justice to all. A great many figures have been quoted with regard to the rates charged by Queensland. It would not be altogether unreasonable to imagine that the rates in Queensland, seeing we have a very large extent of railway—more so than any other Australian State—would be rather in excess of those of the other States. That would really not be a matter for surprise. Where you have a lot of traffic it is quite evident you will have a large income. If you have a great length of line and a small population, then, in order to pay working expenses, it will be necessary to charge higher rates than in the former case. I quite admit that in endeavouring to obtain more, you may obtain less. But I wish to place on record the rates as at present charged in the State of Queensland, and how, as a matter of fact, they compare with the rates of the other States. I shall just read them in order that that may be reported, and then we shall all be able to compare these matters at our leisure. They are as follow:—

State.	Corn.			Potatoes.			Onions.			Milk.			Cream.		
	25 Miles.	50 Miles.	150 Miles.	25 Miles.	50 Miles.	150 Miles.	25 Miles.	50 Miles.	150 Miles.	25 M.	50 M.	150 M.	25 M.	50 M.	150 M.
	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per gal.	per gal.	per gal.	per gal.	per gal.	per gal.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	d.	d.	d.	d.	d.	d.
Queensland...	4 tons and over			4 tons and over			4 tons and over								
	2 6	4 7	11 11	2 6	4 7	11 11	2 6	4 7	11 11	0½	0¾	1¼	1	1¼	2
	under 4 tons			under 4 tons			under 4 tons								
	*4 5	*7 6	*17 11	*4 5	*7 6	*17 11	*4 5	*7 6	*17 11						
N. S. Wales	6 tons and over			6 tons and over			6 tons and over								
	2 6	4 9	9 8	2 6	4 9	9 8	2 6	4 9	9 8	0¾	1½	2	1	2½	3
	under 6 tons			under 6 tons			under 6 tons								
	3 5	6 0	15 0	3 5	6 0	15 0	3 5	6 0	15 0						
Victoria ...	6 tons and over			6 tons and over			6 tons and over								
	3 6	5 6	12 4	2 5	4 3	11 8	3 6	5 6	12 4	1	1¼	2¼	0½	0¾	1¼
	under 6 tons			under 6 tons			under 6 tons								
	4 5	8 3	19 6	4 5	8 3	19 6	4 5	8 3	19 6						

* Less 20 per cent.

It is quite clear to me that, on milk and cream, our rates are considerably less than those charged in the older States. But you will find, on the whole, that the rates for the general articles of produce will compare tolerably favourably with those of the sister States. I hope, at any rate, that the discussion will be of benefit, and I think you may look with some hope to the probability of these matters being taken fully into consideration by the various States after economical federation has become an accomplished fact. At the present time the full federation freedom of trade and unfettered competition has not come about. Of course within about two years it will have, and subjects such as these will deserve, the earnest attention of every politician in the State.

Mr. A. MOFFAT, of Radford, then read the following essay on—

CHEAP MONEY.

The important matter treated of in this paper is of a complete nature, and is surrounded with so many difficulties, even when dealt with by financial experts, that the writer will endeavour in the handling of this subject to confine himself to those phases of it which more immediately concern the settler on the soil.

Money has been defined as being "that which passes freely from hand to hand throughout the community in final discharge of debts and full payment for commodities."

The order of the day is—every man to his trade—specialisation of labour. The jack of all trades and master of none is not a valued member of society. When each member of the community confines himself to his particular trade or occupation he thereby becomes a skilled worker, and the best possible results are obtained from his practised labour. But no matter how proficient a man may be at his special calling, he cannot satisfy all his wants without exchanging what he produces for what some other man produces.

To use a homely illustration, it would be rather troublesome for the farmer to carry a fat pig to the tailor when a coat was wanted, and doubtless it would be just as awkward from the tailor's point of view.

Money, however, gets over the difficulty, and facilitates the exchange of the products referred to. Its invention enables the farmer to exchange his pig for cash, and that cash makes the securing of a coat a less difficult matter than if he had to barter his "grunter" for it. This illustrates money acting as "a medium of exchange." Again, the cash received would be a definite sum—the exact value of the animal disposed of—and the coat required from the tailor would also have a fixed value. The farmer's product might be worth more or it might be worth less than the tailor's; and if the barter system were in vogue, the difficulty of adjusting the difference in value would cause no end of trouble. Money overcomes this, and makes exchange easy, by affording a ready means of estimating definitely the comparative value of different commodities. This *measuring of value* is another function which money discharges in the social organism, and it is scarcely less in importance to that of the service it renders as *a medium of exchange*.

To the most ordinary mind it must be evident that money has become actually an essential to civilised mankind. In the social development called civilisation it is not only the tool we use for effecting the exchange of one commodity for another, but it is also indispensable as a fixed standard value from which all products are valued. By its invention we escape the clumsy system of barter, and the advantages derived from the division of labour are brought within our reach. We are enabled to reciprocate with each other in satisfying the many wants which the higher civilisation of to-day brings in its train. It has aptly been designated by the great economist, John S. Mill, as "only a contrivance for saving time and labour." It is no less indispensable to our comfort and prosperity than the railway by means of which our products are taken to market and our supplies brought to us. Mill's definition of money may not inappropriately be applied to the railway. Both are media of exchange; both are good, but it is possible to pay too much even for a good thing. The farmer may be crushed by excessive railages extinguishing his small margin of profit, and just as truly can he be ruined by having to pay usurious rates of interest on money he has been compelled to borrow to tide him over a bad time. In support of the former, we have it on the authority of Professor Scheligan that in '82 the railroads took one-half of the entire wheat crop of Kansas to carry the other half to market. In this country, the fixing up of the railway tariff is in the hands of the Government, and the Government are in the hands of the people. The interest rates charged to farmers are as yet outside the sphere of the Queensland Government's control.

Individually, it is not in the power of farmers to secure monetary assistance at low rates of interest. They usually drift into the hands of the storekeepers; and whilst, in exceptional cases, most generous treatment is meted out to them, as a rule the reverse obtains, and their condition soon becomes hopeless. The storekeeper has the farmer, who is under obligation to him, held at a great disadvantage, inasmuch as the farmer must buy everything he requires from that storekeeper, and he must also pass the products of his toil through the same hands. Whether he buys or whether he sells, he is denied any "say" in determining prices. What the storekeeper cares to give is what the farmer must content himself to take. The difference between cash payments and booking prices ranges from 5 to 60 per cent. The writer has known of a small chaffcutter offered for £6 15s. cash; booked, £7 15s. In this case, if the accommodation be extended to twelve months the charge is at the rate of 15 per cent. per annum; if six months, 30 per cent.; but it is far from uncommon for a booked purchase to be paid for in three months' time; and if this happened with regard to this particular transaction, then the trifling three months' accommodation was paid for at the rate of 60 per cent. per annum.

It is within my own knowledge, and can be further evidenced by abundant testimony, that this anomaly—the storekeeper-banker—has been the cause of many a struggling farmer's downfall. I have known men thus enthralled who were content to believe that this bondage to the storekeeper was an essential part of their being, and who had become so degraded morally and intellectually that they were incapable of the rational and manly discontent of freemen.

It is utterly useless to expect such men to co-operate with any hope of success, and the great evil of it is that the man so enthralled is dragging down his more fortunate fellow to his own low level. That some means should be found to prevent others from entering on the same downward course seems to be a fact so obvious as to be beyond the necessity of argument. It is undeniable that one of the greatest drawbacks to the development of agriculture in this country has been the high rates of interest charged to those who have been compelled to borrow, the lender being in most cases, as before stated, the storekeeper—"the gombeen man"—and the loan payable on demand. Money at a reasonable price and on long terms appears to be essential to the very existence of the agricultural industry in Queensland.

The experience of older countries should guide and stimulate us in safeguarding those engaged in this avocation. An English paper after inquiry discovered that in thirteen years' time 33,453 farmers in the State of Minnesota, United States, were driven out of their homes at the dictates of the man with the cash. State Assessor Wood, of New York, declared in 1889 that, in his opinion, in a few decades there would be none but tenant farmers in that State. In every quarter of the civilised world the necessity is recognised for progressive finance being brought to bear upon the agricultural industry to protect those engaged in it.

This paper, which must necessarily be of limited length, will not do more than merely touch upon some of the schemes for obtaining cheap money to the soil-tiller.

All efforts in this direction, be it noted, should view with suspicion any and every scheme that would tend to debase the currency of the country, the effect of which has, as the world's history teaches us, always been disastrous in the highest degree. It is the genuine article that is wanted, but at a price which undeniable security and collective effort can command. Of course, every project for cheapening money has its warm supporters, who are positive that their theory is based on the very soundest principles, just as every crow is known to think its own eggs the whitest. Their doxy is orthodoxy, everyone else's doxy being heterodoxy.

The Governments of New Zealand, New South Wales, South Australia, Victoria, Tasmania, and West Australia have conferred immense benefits by advancing the sinews of war to their farming population; the latter, West Australia, having passed an Act of Agricultural Credit before she was one year old as a constitutional colony. Savings banks deposits have been brought into requisition under a Board of Commissioners to find the needful for their settlers at fair rates. The Victorian Government have in a measure adopted the Credit Foncier system, although in France, and England also, this system has by no means sustained the promise of its early years. In New Zealand the advances to settlers have proved so highly successful that Premier Seddon has declared his intention of going further, and giving advances on suburban and township properties. In South Australia their State Bank has realised substantial profits since its inception, and the 1 per cent. difference between the rate at which the money is borrowed and lent more than covers all expenses. In Queensland we have men in power who uphold the grand maxim that the credit of the State should only be given where the whole of the people of the State are to be benefited; but they do not invariably adhere to this, for they have instituted a system of cheap money to a certain class of cultivators of the soil under the control of and guaranteed by the State. Their beneficent financial assistance, combined with cheap labour and the most fertile soil the world knows of, has made the Queensland sugar-grower what he is to-day.

The Co-operative Land Banks of Germany have been in existence for generations, and are recognised as having been instrumental in promoting prosperity and happiness to the people of that great empire. The Landschaften of Prussia is a sort of communal combination to secure capital for graziers and farmers at a reasonable rate of interest. It is under Government supervision and audit, but is quite free from any taint of the grandmotherly guarantee legislation which is found necessary to bolster up our sugar-growers.

It may be open to question, however, whether the scattered nature of our population would not militate against its success here. That which was introduced as suitable to the old settled population of Prussia 100 years ago is not necessarily the best adapted to meet the exigencies of the pioneer community of a new country at the present day. The Landschaften may be looked upon as more adapted to countries where the farmer is a cultivator of leased land, owned by big land proprietors, such as prevails in some of our sugar districts. In this country—excepting the sugar parts—we have a yeoman class with small areas. They are of manifold nationalities and creeds; their knowledge of each other is of comparatively recent date, and their knowledge of each other's antecedents is *nil*. It seems doubtful—even if they were freemen, which would be

contrary to the general rule—whether their confidence in each other be sufficiently established to suffer them to pledge their credit to make good their neighbour's credit. One of the fundamental principles on which the most of agricultural credit banks are based is that "all real estate advanced upon must form with like real estate in its neighbourhood, similarly pledged, a solidarity of interest, and be jointly responsible for a definite total advanced."

The praiseworthy efforts of the British Government to assist the farmers in Ireland are deserving of notice. In Britain, under the Land Purchase Act for Ireland, money is borrowed by the Government at $2\frac{3}{4}$ per cent., then loaned to the tenants to enable them to purchase their farms at 3 per cent. The apparent profit of $\frac{1}{4}$ per cent. is for the purpose of paying the necessary expenses. In addition to the 3 per cent. interest the borrower pays 1 per cent. redemption money, making a total of 4 per cent. In thirty-seven and a-half years' time the whole of the debt is paid off. Money is loaned to the full value of the property.

It may be interesting just at this point to note the marked difference in the ultimate results of dear money and cheap money operating on a farming community. Take the Irishman who borrows £500. The land, as security, is worth only £500, and not £1,500—as would possibly be required in Queensland for a £500 loan. The Irishman pays £20 yearly, and in thirty-seven and a-half years he owns his farm without one farthing of debt, or any further liability for yearly payments. Now, let us take the Queenslander who borrows £500 on his £1,500 property. The undoubted security has not, during my thirty-four years' residence here, saved him from big interest charges, and 10 per cent. has been an average rate. Some may consider this estimate exaggerated, but investigation can prove that it was quite in the ordinary course of business for 15 per cent. to be charged by the money-lending storekeeper not so very long ago. A farmer borrows £25 from a lawyer, and gives in exchange a promissory-note for £30 at three months' date. This represents 80 per cent. per annum. Transactions on this basis were far from uncommon. The country butcher, not too prosperous himself, had to deal with people in a still less flourishing state. His extra halfpenny for booking three halfpenny beef meant 25 per cent. if twelve months' credit were given; 100 per cent., if three months; but, as a matter of fact, *one* month was the usual credit term, so that the farmer, in his helpless state for want of the needful to get his supplies on a cash basis, was paying at the rate of 300 per cent. per annum. Ten years ago our Goolman Divisional Board were paying 9 per cent., when the bank overdraft of £600 was, in a sense, secured by the whole landed estate of the division valued at £500,000.

After this digression, and taking it for granted, then, that 10 per cent. is conceded as an average rate in the past, let us assume that the Queenslander (who is liable for 10 per cent.) fails to pay more than 4 per cent., the same as his Irish brother, and see what becomes of him. At the end of the first year the Queenslander owes £50 for interest. Let him pay only £20, like the Irishman, and he still owes £30 interest. Add this £30 to the amount borrowed, and his debt after expiry of one year stands at £530. At the end of the second year, adding interest on interest, and after paying £20 —which gradually frees the Irishman—the Queenslander is now indebted to the amount of £563. And so he goes on paying yearly all that is required from the Irishman—namely, £20; while the excess over and above 4 per cent. is allowed full play, to demonstrate what high rates and compound interest can accomplish in this glorious land of free and enlightened citizens, where unbridled liberty reigns, and where every attempt to relieve the struggling settler is voted "grandmotherly." The payment of £20 yearly frees the Irishman, and constitutes him absolute owner of the farm he only leased thirty-seven and a-half years ago. The same £20 payments from the Queensland farmer leave him at the end of thirty-seven and a-half years with an accumulated debt amounting to £10,891 4s. 6d.!!! The Queenslander has borrowed the same amount as the Irishman; he has paid the same yearly payments; he has given greater security. Result—the Irishman is free; the Queenslander groans under the crushing burden of £10,891 4s. 6d.

Cicero mentions that Cato, being asked what he thought of usury, made no other answer than by asking the person who spoke what he thought of murder. And we are asked to submit tamely to the dictum that "cheap money would drive away the financial institutions—those institutions which have made Queensland in the past." From all such countries as are infested by 10 per cent. financial institutions, good Lord deliver us!

There are many squatters, farmers, miners, and various industrial workers in Queensland who have been crushed beneath the burden of excessive interest rates, and who wonder in a vague way how it all came about when the final crash comes, after long years of agonizing struggle against overwhelming odds. They have simply

paid for money—this "contrivance for saving time and labour"—what no industry under the sun can afford to pay.

This paper does not presume to suggest a remedy, but claims to be an effort, on the part of one who has suffered from the evil he denounces, to assist in arriving at a true diagnosis of the mischief at work, in order that those we have placed in power may be strengthened and encouraged in wielding that power as a weapon in defence of those engaged in the primary industries of this young country against the further encroachments of big interest, with its banefully paralysing and ruinous consequences.

From the public utterances of our leading men, let us examine what grounds we have for hoping that any immediate action will be taken in this direction. We have it impressed upon us by the Press of the country that there are only two political parties in the State—the Individualist and the Socialist. First, let us take the Socialist:

From a newspaper having for its motto, "Socialism in Our Time," an excerpt has been taken referring to a resolution carried by the South Australian Legislative Assembly, affirming that the State Advances Act should be extended in the direction of allowing advances not only to farmers, but to other producers. It reads as follows:—

"This might be used to open up a discussion on a question that is rapidly growing in importance, and, indeed, deserves the fullest consideration. It is briefly thus—'As a means towards the attainment of a socialistic method of production, is it more wise to encourage a system of State aid to small producers—in other words, a systematised hampering of capitalism, or to allow the capitalist system to evolve unchecked, along the lines of competition and individual monopoly, towards that organisation and public monopoly, which is socialism?'

"This question has been considered in America, the home of triumphant plutocracy, and the *People*, the socialist organ of New York, declares that the most speedy attainment of Socialism will come through the unrestricted development of private capitalism, until all the resources of a nation are concentrated in the hands of a few individuals, when the mass can the more readily be brought to see the benefits of the nationalisation of the means of production and distribution. It points to New Zealand as an example of the opposite policy, and points out that it is purely a case of 'hampered capitalism'; leaving the intelligent reader to infer that inasmuch as society is an organism, and private capitalism being merely a stage in society's development, the more you hamper private capitalism the longer you keep it in that stage, and the more you check the progression of the organism to a higher development. America herself is a pregnant example of the extraordinary rapidity with which the social organism may advance through the various stages of capitalistic development when unhampered by restrictive conditions. America is rapidly reaching a condition when all the resources of the nation will be in the possession of so few individuals that one will be able to count them on one's fingers. That nation, then, will be ready for socialism. The time will have come when it must advance to an entirely new stage of development—a degree of evolution unattained by any society of which the world possesses a record. The doctrine of socialism is rapidly spreading among the masses of America. Already they have candidates in the field for the presidency and vice-presidency; and, doubtless, when the great crisis comes, the workers of America will know how to work out their own salvation.

"The real question to us, then, resolves itself into this—Which is the better plan for us in these colonies to pursue? Already in these colonies we are committing ourselves to the wrong end of New Zealand's policy, and we have great projects for buying back land from monopolists, and selling it at a low price to the worker who desires to go upon the land, systems of State aid to farmers now proposed to be extended to other producers, &c., &c.—in a word, numberless projects for stopping the encroachment of the large capitalist upon the smaller. This is the point: It is contended by some that this is the correct policy to pursue, in order to bring about the accomplishment of 'Socialism in Our Time'; that the State should be used as a means to stop the expropriations of the large capitalist, and to assist the small producer. Others, again, hold with the United States journalist, that measures such as are now being promulgated can be at best only palliatives, and that the most speedy way in which to attain socialism, either in our or anyone else's time, is to throw all our energies into the task of educating the workers in the doctrines of socialism, to pursue a ceaseless and unremitting socialist propaganda against private ownership of the means of production, to show the worker that nothing can permanently better his condition but a complete change in the method of production, and in the meantime *let the extinction of the small capitalist go on unchecked* until we reach that stage when the birth of a new system becomes not only speedy and possible, but absolutely necessary.

"Such palliatives as a minimum wage law, a Factories Act, an Early Closing Act, are not to be confounded with enactments to protect the small producers against the competition of the mammoth syndicate. The former may appear to hamper capitalism; in reality they only aid in its development. To have to pay not less than a minimum wage, to have to provide so many cubic feet of space for factory hands, to have to close at reasonable hours, to adopt proper sanitary measures to ensure the health and comfort of the wage-slaves, are inconveniences which affect large companies to an infinitesimal degree compared to the extent to which they affect the small competitor. The big monopolist can meet the new requirements with ease; the small man's troubles increase. The small man has not only to combat the low prices of the big one, but he has to sink more capital in larger buildings, and add to his working expenses. Reformers must give more attention to educating the workers as to the probable effect of the legislation which our politicians are too prone to bring forward, masquerading in the garb of labour and socialism. Any measure which will increase the wage-earner's wages, reduce his hours of labour, give him better air to breathe, will hasten socialism, while hampering the small capitalist, and reducing the number of that class which fight socialism because they hope to become large capitalists some day. Any measure designed to supply the needy adventurers and others with State money to compete with the big syndicate in exploiting the public will only retard the forward movement."

The same paper again refers in a succeeding issue to the subject "State Aid *v.* Socialism," as follows:—"The importance of the question cannot be exaggerated, especially to the socialist in these Australian colonies (where much of the preliminary work in the direction of extending the function of the State is an accomplished fact), because it involves the adoption and pursuance of one of two courses: (1) Acceptance from the ruling party, as payment for support, of measures of *partial* relief from the thraldom of capitalism; or (2) Implacable resistance to all measures which, immediately palliative though they may be, are unmistakably effective in prolonging the existence of private capital."

A week after the above was written, the following appears under the heading "Socialist League Notes":—"Resuming the consideration of last week with reference to the line of political action immediately necessary, I hold that the socialist must be conscientiously opposed to the first course (acceptance from the ruling party of measures of *partial* relief from the thraldom of capitalism), and that he is not justified on grounds of policy in adopting it, as it involves complication and obscuration of the issue, and indefinite postponement of what must come ere industrial freedom is accomplished—namely, State possession of the means of conducting industry. The neighbouring colonies furnish us with examples of legislation recommended by the several Governments as socialistic, which at a time within the memory of most living men would have been declared to be sufficient for the solution of the problem of poverty. But what have Acts for the aid of the small capitalists in their battle with huge monopolists done for the propertyless? They have increased the number of his enemies—for it is undeniable that the man with property is opposed to being dispossessed of it by the State; his inherited instincts revolt at the idea, and his knowledge of the advantage he possesses over the propertyless is a still more potent motive. The Radical has plenty of sham socialism up his sleeve, and he will play them for all they are worth. The socialist must decline to be tempted; his is a fight against private ownership of the means of industry, and every legislative Act which prolongs its existence is a sign of his defeat."

From the foregoing it will be observed that the socialist holds up New Zealand to your gaze as an "awful example" of *capitalism not having its full swing*, or, as they put it, of *hampered capitalism*. To the socialist it is just as sure as death and taxes—we must die that we may live. We have been taught to believe that only through death and the grave can Heaven be reached. We die to live the better life. To gain the paradise promised by the socialist, we have to submit to extinction. Human nature regards death and the grave with horror, notwithstanding the hope of translation to a higher sphere, and a happier state to follow; and the self-same instinct provides the farmer with a natural aversion to extinction, in spite of the assurance held out by those who see with prophetic vision that the advent of an earthly paradise only awaits our complete annihilation. It should be noted that the socialist has his special pets. The wage-earners go straight to paradise, English-like, without suffering the inconvenience of being extinguished to make way for the birth of the new system.

And now for the Individualist:

His Excellency the Governor, whose utterances must always harmonise with the opinions of his responsible advisers, declared at Maryborough that the farmers should be allowed to work out their own independence. Sir Horace Tozer, at Gympie, said:

"If they could bring in a Bill, it would have no remedial effect on the farmers in this country. The great majority of them, through hard times and bad seasons, had had to hypothecate their deeds for more than 50 per cent. of their value, and no system could be devised by which money could be safely lent above 50 per cent. of the valuation. He was decidedly against a State Bank, and thought the time had not arrived when they could introduce the Credit Foncier system, or use the State credit for the purpose of giving cheap money to the farmers. He believed if the Government started any scheme of the kind they would be 'had' in the beginning in valuation. He thought the farmers would get more benefit from dealing with those institutions which had made Queensland in the past. About six years ago Sir H. M. Nelson announced that he would be prepared to give favourable consideration to any scheme for advancing cheap money to farmers, the principles of which might commend themselves to his judgment, and which were consistent with sound principles of political economy. This announcement was characterised at the time by cheap-money advocates as a *shuffle*. There was certainly a sort of hocus-pocus style about it, which would translate this way, that way, or any other way. It was as clear as mud, and did good work, as the candidates before the farming constituencies called it *a promise*, and worked the promise for all it was worth in securing support for the Nelson party.

The late Sir J. R. Dickson declared the matter to be one that could not be undertaken by the Government, but that it might be left to divisional boards. So far as progressive finance is concerned, the placing of bank directors and others directly interested in banks at the helm of the State is like appointing the wolf as guardian of the sheep.

Mr. Rüthning has for many years been earnestly endeavouring to popularise the system of land credit banks, but all the thanks he got for his pains was to be dubbed a "socialistic lawyer" by the late Sir Thos. McIlwraith.

The late Mr. Chataway's scheme, which was passed by the Assembly last session, was rejected by the Council. While we would naturally expect a few weeps over such a tragic event, not a solitary weep has as yet been recorded on the part of our representatives in Parliament.

It may be gathered from the foregoing that the Individualist party concedes to us no more reasonable grounds for hope than the party who hankers after our complete extinction that their forward movement may not be retarded.

It is beyond dispute that the political power which farmers can wield is very much below what it ought to be, and what it could be, if they would only organise themselves for the advancement of their own class to the extent that the poor tenant farmers and agricultural labourers of Ireland have done. The agricultural interests of this State are moving rapidly towards a front place, and we are becoming a power that no political party can afford to trifle with. We are entitled to a more just reward for our labour, and a more equitable share of the wealth which we produce, so that we may raise ourselves from our life of drudgery to a social state more in keeping with our value to the State socially and economically. Our representatives in Parliament should not be *party hacks*. How frequently have we witnessed in the past the influence of farming representatives neutralised by voting against each other at the bidding of their party? On occasion they have sacrificed their principles and their constituents' interests because of their being bound hand and foot by the fetters of party loyalty. Common sense should prevent the division into hostile camps of those whom a common purpose ought to unite. It may yet be necessary for farmers to aim at the balance of power in Parliament—a policy which has in a marked degree succeeded in gaining concessions to the wage-earning classes of other States.

In concluding, it must be confessed that this paper has lengthened out far beyond what was originally anticipated, and many interesting features of this subject, which is one of world-wide controversial interest, must of necessity be left untouched. Let it be clearly understood, however, that the writer does not plead for favours, or for any concession in conflict with the interests of other classes of the community. The *non-possumus* attitude of the present and past Governments towards this vital question not only excites our wonder but provokes our indignation. We look upon it that high interest a contrivance for putting the money of the many into the pockets of the few —is beneficial chiefly to foreign syndicates and absentees, who draw away the wealth of the country (as shown by the large excess of exports over imports), and pay little or nothing for the protection of their property or the administration of the Government generally. Believing, as we do, that every statesman worthy of the name should aim at a more equal distribution of wealth, we see that big interest few receive it, many pay it works in an opposite direction, and tends towards concentration, thereby affecting the purchasing power of the community in general. If the majority had

less to pay for money, that indispensable article would be in greater abundance, and, in response to its greater sufficiency, wages would be higher and prices increased all round. This, I take it, spells prosperity. Cheapness of living is always associated with a low standard of life. Anyone disputing this is free to experiment in a blackfellow's camp.

Our capacity for production is absolutely boundless. It only wants a sufficient stimulus. Consumption is that stimulus; and consumption is without limit so long as the ability to buy is with the people.

It has been contended of late years that the function of issuing notes, passing by delivery as money, should be reserved for the State, or for some institution controlled and directed by the State. It is obvious that the State could conduct the paper money business on a far smaller gold margin than the private banks; and it might also be granted that financial panics—with their slow martydom of recovery—such as we have had bitter experience of in the past, would be looked upon as events that could not in any conceivable way recur again if such an institution were established. There is no more need for us to confine ourselves to the crude ideas of our grandfathers regarding the banking system than there is to retain their means of locomotion or their rude appliances in agricultural industries.

Progressive doctrines are now universally received that fifty years ago would have been laughed at as "the impractical theories of visionary dreamers." Experience has taught us that any legislative body with the lawyer element predominating is notoriously hidebound in the absurd conviction that *reform* means *revolution*. Lawyers can only appeal to usage, precedents, authorities, and statutes.

Have we any Jonahs on the ship of State that want throwing overboard? "What meanest thou, O sleeper, arise," was the prelude to the defaulting Hebrew of old being cast forth into the deep; and to those who may be asleep on the State ship we say "Arise, rouse yourselves, and be awake to the greatness of your responsibilities."

DISCUSSION.

Mr. T. de Murray-Prior (Maroon): I am very pleased that Mr. Moffat has taken up this subject of cheap money, as it is one that I am interested a good deal in, and I remember many years ago taking my friend, Mr. Rüthning, up into our district, where he lectured on the credit foncier principle. I was in hopes then that some system of cheap money for producers would have been initiated long before this. I can speak of the trouble of having dear money, and for many years I had to pay 8 per cent. myself. I can remember, too, when 10 per cent. was thought a very moderate interest. We are now in a very different state, and, as trustee of an estate, I find great difficulty in getting over 3 per cent. The banks are giving 3½ per cent. in some instances, yet they are lending money out at about 6 per cent. to producers. Some means ought to be devised, if we as a people could put our heads together, by which money could be made cheaper to the producer—that is, to the small farmer principally. The credit foncier system is the one that appeals most to my mind, but any system in which the principles are sound, could be initiated in this State with great success. That is, money should be lent at not over half the value of the property it is lent upon, and that 1 per cent. should be charged over and above the interest charged as a gradual wiping off of the mortgage. That would be a sound principle, and I am confident that if we could get the credit foncier system established under Government supervision, it would be a great aid to men who want to lend money. It would be a great thing if they were assured of a fair interest, and knew they were lending their money with safety on our own land and amongst our own producers.

Mr. F. W. Peek (Loganholme): I was very interested in Mr. Moffat's paper, especially in his remarks having reference to the credit foncier system. Some of you are aware that at the Mackay Conference I wrote a paper dealing with what I called an Agricultural Bank Bill. I have not seen any reason to diverge a point from what I then said. Mr. Moffat referred to the need of organisation to reduce the rates of interest. I say what we want is an organisation among the farmers to start co-operative banks. In the co-operative bank is to be found the secret of success for our farming community. The credit foncier system was organised by a band of co-operators. Eighteen

men with £18 capital was the origin of the system. We have heard a little about the Irish bank. It was started by Lord Ranfurly (I am not quite sure of the name) on a co-operative basis. Paddy paid his penny into the bank, and from that bank he went to borrow the price of a pig to put into his sty. That is the way you can bring banking to be a success among small farmers. The State has introduced in the Repurchase of Lands Act a system of cheap money, and we know that this Act has done a vast amount of good. But it does not go far enough. I find that those individuals who have taken advantage of the long terms and the low rates are unfortunately in possession of very little capital, and a system is now required by which small amounts can be borrowed, repayable when their crops come in, on very easy terms. I may say that I had several conversations with the late Mr. Chataway upon this subject, and went carefully into the West Australian system with him. I cannot say that I altogether agreed with this latter system, although it is a great idea, introduced into that State, as Mr. Moffat said, during the first year of its autonomy. But there are certain indications there of cases of funds being applied for or allotted which do not have the desired affect. When money is procured cheaply, or too cheaply, it is apt to be, as a rule, not so beneficial as it might be. If money had not been so cheap at the time of the £10,000,000 loan, a good many of our difficulties would not now be present. Money being so easily obtainable was the means of causing a great many people to suffer. With regard to farmers being in the hands of storekeepers, I may say that, finding the storekeeper had a grip on many of our farmers, our association got the South Brisbane Municipal Council to erect markets, so that we have now a farmers' retail market there. It has been a great success, and now it has been proposed to duplicate it. It is only by organising and co-operating that the farmers will effect the many reforms needed by them. Let them have the co-operative banks that they have in England, where the people can borrow their own money at low rates of interest. I would suggest that the money in the Government Savings Bank be lent out to people at low rates. It is a source from which we could obtain money.

The Hon. Angus Gibson (Bundaberg): Cheap money is what everybody wants, but an equally important question is how to use it when we get it. I was reminded, when Mr. Moffat was reading his paper, of a story. When the Reform Bill was being passed in 1832 for the betterment of the working classes in Great Britain, a committee was appointed to travel throughout the country with the view of finding out how the condition of the workers could be improved. They came to Kirkaldy, and the parish minister of the town was brought in to see if he could give any idea as how to work out the betterment of the town he lived in. In reply to their inquiries as to whether he did not think that shorter hours and more money for the people would be an improvement, he replied that doubtless it would, but that, if it were given, it would be his business to go to Heaven to pray to the Almighty to give them wisdom to use it. This question of cheap money was very much in the same category. When money is easily got it is just as easily spent. After thirty years' experience as a borrower and a lender, I have come to think that it is a great mistake to lend money easily, because you have a good chance of never getting it back again. The bill for cheapening money was passed in the Assembly last year, and was handed over to the Council for consideration. Some of us fogies there thought Queensland had sunk enough money already in similar schemes, a good deal of which might possibly never come back. Personally, I did not think—and I have not changed my mind—that this State should lend money. There are stories told of New Zealand of how they would be glad to climb down if they had the opportunity. I have found that the more concessions you give the more you will have to give. I know men in Queensland who, instead of growing their own potatoes and maize, buy them from the grocer. We should endeavour to inculcate in our farmers the idea that they should grow everything in their gardens for their own wants, so that they would have to buy nothing outside

save clothing and the few things outside their own industry. The farm ought to give every man nearly everything he wants, yet you will see many a farmer in Queensland without a potato, without a pig, or without even a cow.

Mr. J. E. DEAN (Maryborough): When I first came to Maryborough I saw a nice, benevolent-looking gentleman riding in his buggy, and on inquiring who it was, was informed that it was "Mr. Fifteen per Cent." This gentleman at that time earned a very profitable income by lending money to farmers at 15 per cent.—hence his name; but he now complains that he cannot obtain more than 8, which he considers very low. In fact, he is getting out of employment. Necessity at one time caused me to borrow money. I had to pay 12 per cent., and I had a hard struggle to redeem myself. There is a danger in cheap money. You perhaps try to borrow too much, and then, again, you may be less careful in your disposal of it. It has been said that if we are able to borrow cheap money it is possible it will induce a larger population. That, in my opinion, would hardly be fair when we consider those who have to carry on in the country while under the hands of the financial institutions and money-lenders. These men have to pay 6, 7, and 8 per cent. It is hardly fair to establish in competition with them, men who would only have to pay 4 per cent. It would accordingly be necessary to lend money to those who are already so deeply in debt. Looking at the matter from all sides, it is very difficult to see how the problem is to be worked out, and, personally, I do not see how the Government is going to take it in hand. It is said that in England there are £500,000,000 lying in the banks, and that the greater part of it is not returning any interest at all—a serious matter when looked at in the light of social economy.

Mr. LESLIE G. CORRIE (Brisbane): I am glad Mr. Moffat has entitled his paper cheap money rather than State aid. Farmers should not require that, and I do not believe that they do require a great amount of assistance from the Government. As one who has had something to do with the lending of money—not lending my own money, but through my profession as a valuator—I know it is extremely difficult to obtain money on farming lands. It is a fact that in all industries money has sometimes to be raised, and it is very hard if any section of the community is at a less advantageous position than any other section in this connection. My experience has shown that this is true of the farming community. It is for the same reasons as those referred to by Mr. Burgess in his remarks on organisation. His land is difficult of access, and those who have the money are loath to lend it on properties which they are unable to inspect. They consider, too, that farms if not properly looked after are apt to considerably depreciate in value. A person with money is far more willing to lend money on a piece of land in Queen street than on a piece of property a long distance away. Seeing the success that has attended this question when tackled by the State in other parts of the world, I am satisfied that something can be done on thoroughly business lines to assist the farmer. It seems it can be quite as much a business matter as the conduct of our Savings Bank. I should be against making the money especially easy—that is, to be got without the Government being thoroughly protected. It seems that the system should be established upon thoroughly good business lines—not for the purpose of giving the farmer special facilities for borrowing, but to enable him to get money on reasonable terms and at perfect security to the State. Not only is some system worth a trial, but the introduction of one is a necessity.

Mr. C. ATTHOW (Brisbane): I have been in business for a number of years, and, as a business man, can speak with some authority on this subject, which has agitated my mind for a number of years. Not only that; I was on the land, and well know how vital this subject is to agriculturists. As for Mr. Peek's agricultural bank, I am sorry that I am not very confident about its ultimate success, the main difficulty being that you cannot get farmers to agree together sufficiently. The Government look after our money in the Savings Bank, and surely they can lend it out to those who will make good use of it. That, I

believe, can be done. Take the way the Government got rid of their land by selection: A man takes up 640 acres, and he pays for it, say, from £50 to £60 per year. In how many instances, where the land was good, did that man forfeit his selection? Now, when he paid that £50 or £60 for ten years, and the land had become his own property, surely it would be safe enough for the Government to advance him £200 or £300. No money was advanced to these men when they took up their selections. Yet the rents were always met, and the men were faithful to their covenants. Surely they could be quite as faithful if a little money was advanced to enable them to stock that land and make further improvements. Whoever has the letting out of this money will have to take into consideration the character of the borrower, and to what purpose he intends to devote it. Farmers are placed at a disadvantage in several ways in the borrowing of money. Country land is not generally regarded by townspeople as the most satisfactory security. Then there are the long distances from town, which make valuation expenses heavy. A farmer, again, is not a practical business man, and does not know how to work these loans out to his own advantage. Many of these disabilities would pass away, however, with a good board, and the farmer would be placed on the same footing as the man in the town. I, for my part, do not think there is anything very dangerous in the proposed scheme. As for the ten-million loan, it is well known that it can hardly be said that money was distributed in business loans. It was thrown amongst the people anyhow; and, after all, it has not had a very deteriorating effect upon the State. As for the danger of money being obtained too easily, safeguards can easily be made to prevent any danger arising from that.

Mr. John D. Johnston (Mosman River): Nothing could assist a farmer better than if he could get money when he required it, and care were taken that the money was spent on the land. It is difficult to see how that man could be injured by the money; and, for my part, I think it is the best thing that could happen to him. In our district, we have inaugurated a system of lending money to canegrowers, which has worked admirably, and so far we have not lost a penny through it. By it many a man has been enabled to put an area of land under cane and cultivate it who would not otherwise have been able to do so.

Mr. J. W. Lee (Zillmere): This is a very important subject we are discussing, and I think we ought to grasp the real situation, if we can, for the men who are struggling upon the lands of the State endeavouring to make homes for themselves and their families. I myself have been struggling here for nearly forty years. I entered in 1866 upon a piece of Government land that I had to pay £1 an acre for, and I had to pay for it in eight years. I had to clear it, and had to pay my £10 a year to the Government at the rate of half-a-crown per acre per year. I well remember the difficulties we had in clearing the forest trees from off the land, the fencing, and the ploughing; and I maintain that had there been a bank from which the Government could have lent me cheap money it would have been one of the greatest blessings, and would have given wonderful assistance to me. There are numbers of people starting to-day as I did thirty-five years ago. I am thankful to say that if the bank were started to-morrow I would have no need of it, but the time has been when I have needed it. I was ultimately compelled to borrow money at the rate of 12 per cent., and it was years before I could liberate myself from that burden. Some of the men who have borne the heat and burden of the day have sunk themselves into difficulties, and cheap money to them now would be a great boon. As they now are, they are almost certain to sink under the weight of heavy interest. The Government has money in the Savings Bank on which they pay 2½ per cent. to depositors. If they could let that money out at 5 per cent. it would be a great thing for many struggling farmers who now have to pay their 8 per cent. I see no reason why a cheap money scheme should not be adopted. No one wishes to jeopardise the Government, nor is it right that it should be jeopardised. But the first few years of a man struggling on the land makes or

mars him, and a cheap money scheme, if the Government could see its way to take such a step, would be a great boon to a great number of people now on the soil.

Mr. PERCY BIDDLES (Tiaro): A few years ago there was a struggling community of about a dozen men some distance from Maryborough, who, if they went into town, went the back way for fear of meeting the storekeepers and being asked for money. Eleven of these men met together for the purpose of borrowing a certain sum of cheap money. In Sir Horace Tozer they certainly had one of the best members in the House, but after working for two or three years they got £30,000 to put up a central sugar-mill. Directly, this has not paid the Government, but indirectly it has paid the Government, the people, the country, and the district. Those farmers who borrowed the money have to-day splendid houses; most of them drive buggies. The land that was taken up has increased in value enormously. Tramways have been built. The revenue of the divisional board has increased. The cheap money at Tiaro has done an enormous amount of good. There are other instances in which cheap money could be made of use. A system of some sort could be introduced with regard to communities of farmers—not that I ask that farmers should be favoured more than any other body of men, but it would be an advantage to the country could communities borrow money from the Government, giving security in the same manner that the central mill shareholders do.

Mr. W. R. ROBINSON (Toowoomba): Cheap money would doubtless be a great thing, but the question is, Where are we going to draw the line? Should no other men but farmers have cheap money? There are many worthy artisans, men who have good ideas of inventions, but who have not the money to put them into effect. Mr. Corrie stated that there was difficulty in obtaining money on farming properties, but I know that on the Darling Downs financial institutions are lending money on agricultural freeholds at 4 per cent.

Mr. DEACON (Allora): No.

Mr. ROBINSON: If you have good security you have no trouble in getting money. If your security is rotten you must expect to pay a higher interest. Selectors have really no security to offer. You could not expect a State bank to lend them Savings Bank money with a chance of its not being repaid. There is no doubt that, if a farmer on some of these newly taken up selections goes to the storekeeper, the storekeeper will assist him. There are many struggling farmers below the Range who owe their selections to Cribb and Foote. If a man has freehold security he can get money from almost any money-lender at 4 or 5 per cent. I sold a farm the other day for £800 to a young German. Another German then and there lent him the whole of the money at 4 per cent., although in this case I will admit there was more security, as the young fellow was marrying the other's daughter.

Mr. E. ROBERT (Cairns) contributed a few, but pregnant, remarks to the discussion.

Mr F. WILLIAMS (Upper North Pine): I represent a purely farming district—that of the Upper North Pine and Samson Vale. There the farmers have had an uphill fight; but taking it all round they have managed very well, and indeed some have got on wonderfully well. Some would have liked to have had cheap money, but they preferred working, with the result that they were able to keep their land. However, bad times set in, and the pressure began to be felt. A few years ago there was a difficulty in the disposal of butter. We, however, combined, and started a co-operative factory, which enabled us to put a good article on the market, which, in fact, has been the making of the district. I must here acknowledge the assistance we got from the Agricultural Department, we having got a loan for the erection of the factory under the Meat and Dairy Produce Encouragement Act. We were really, however, working on our own money, the Meat and Dairy Fund having been raised from a tax on cattle. The factory has undoubtedly been a great

success. Several of us have shares, but no one is allowed to have more than £100 worth. We do not study the shareholder, but the milk supplier. If there is a surplus after all expenses have been paid, of course we pay a dividend; but the factory is not run with that object in view. My idea is for farmers to co-operate among themselves, and mutually assist each other by lending one another, if need be, money; and that, as a matter of fact, is what is done in our district.

Mr. W. P. Cooksley (Brisbane): We all like cheap money but, as is well known, cheap goods are sometimes nasty. It may turn out so with cheap money. It certainly would do so if the money were lent out indiscriminately by the Government. We would have every Tom, Dick, and Harry coming to the Government for a loan, and, therefore, if we are to have cheap money it would be as well to see that it is lent properly. The borrower should have a holding before a loan was granted, and then this should be granted only to enable him to stock his farm or possibly erect machinery to treat his product or otherwise. To my mind a good plan would be a system to enable the farmer to make use of his product on much the same lines as the Sugar Works Guarantee Act. Of course, there the Government have some assets, although, in some cases that I know of, if they tried to realise on them they would not get much. I know where money was lent in connection with one of these sugar-mills where the valuation of the property was made at a tremendous rate over the value of the property. Those properties must necessarily fall into the hands of the Government. They are not where the sugar-mill is, and as to getting cane to the mill there are no facilities for that being done at present, and never will be, so far as I can see. We had a cheap money Bill before Parliament last year, but it fell through. I do not know why, but Mr. Gibson and others who were responsible for its being fired out, could doubtless tell us. However, if we are to have a system of cheap money definitely introduced into the State, it must be for some ultimate good. It will be no use giving cheap money to a man who knows nothing about farming, but if it can be given to assist a genuine farmer I think a lot of benefit will accrue.

Mr. T. Burgess (Forest Hill): The principle involved in this discussion I am satisfied, by bitter experience, is a right one. and it is difficult to understand that, as soon as ever a question is brought up involving a great principle which every man feels convinced is a correct one, people start to rake up difficulties and start to work out the details of the thing before they have laid down the principle or agreed to the principle involved. Did anyone ever yet see a good thing that was got cheaply? The greater the difficulty, the greater the good in the principle very often. I know what it is to pay interest. I have been through the mill, and I can assure you that if I could get £1,000 to-morrow at 5 per cent. I would not touch a shilling of it. As long as I live I shall never borrow another shilling. I shall stand alone if I die with but one acre of land. Mr. Robinson made a remark about rotten security. You have to pay 9 and 10 per cent. if your security is rotten, but it is the men with good security who do not want to borrow money. If you do want to, it is easy enough to get it. It is the men with the rotten security who need the money, the men who are going on to the land and who are starting their struggles. This cheap money system can be introduced, and I am certain that we have men who will be able to introduce a scheme that will be of benefit to the pioneer population of our State. I know it is beset with difficulties, because our territory is so large and the operations of the scheme will extend over thousands of miles of country. But what do difficulties exist for? Only for strong men to overcome. Did you ever see a strong man who never met a difficulty in his life? In our present Minister we have a strong man, and in our late lamented Minister we had a strong man; and such men are capable of preparing a scheme and carrying out that scheme to the benefit of the State. I say it is a shame Mr. Chataway's Bill was thrown out of the Upper House last year. This was quite on a par with a lot of the

actions of that fossilised body. I know, for one, it is not a safe thing to get money too cheap. In the 1893 crisis there was a firm in the West Moreton district that acted in a munificent manner towards their clients. They voluntarily charged no interest for four years—not one shilling. There were men who were able to appreciate the blessing and took advantage of it. They reduced the principal. Other men loafed on the generosity of that firm, and at the end of the four years they were a great deal worse off, and had not one good word to say in favour of the firm that had stood by them. Surely our administrators have some judgment of human character, and although there are men who will impose on their generosity, yet the love of home and freedom is a British instinct; and if the best of us get the ghost of a chance we will make our homes our own. The best thing the Government has ever done has been the repurchasing of those splendid estates and placing them, on the easiest possible terms, within the reach of our young population. We have two of these estates near to where I live, and although it is only five years since they were cut up, there are now splendid homes on them. We have been twenty years under the old system doing what they have done in five. I borrowed £500, and now these men have got better places than I have. They have done in five years what we have been trying to do in fifteen and twenty. When the Government grips this question like men and places before us a system of cheap money, it will be one of the greatest blessings ever conferred upon the population of Queensland.

Mr. T. E. COULSON (Rosewood): Like my friend who has just sat down I started at the beginning. To make a home for ourselves is a British instinct, and if we see a chance of making one, well, a chance goes a long way. There are any amount of men who, if they are given a chance of getting a piece of land to make a home, will seize that chance. Many of us have had to borrow money, and we have generally had to pay through the nose for it. We found it like a millstone round our necks that was dragging us down, but with determination, energy, and perseverance, many of us have been able to free ourselves. Some of us have now increased, however, and for myself I may say I have nine or ten sons, besides daughters. The point is now, How are we to place these successfully upon the land? I had the pleasure of seeing the cheap money scheme that was drawn up by the late lamented Mr. Chataway. It apparently came to life in the Assembly, but when it reached the nominee Chamber it was thrown out. What could you expect when that House is composed of a lot of gentlemen who are lenders of money? We know this very well: Those who have money to lend want to make the best use of it. The principle, however, is already established by the Government: money is already lent out to start co-operative dairies. My experience is this, however: You may call it cheap money, but it is not so. It is hedged in with so many red-tape restrictions that it is often cheaper to get the money privately. One fact I would like to impress upon you is, that there are any amount of people who are starting working up a home whom a little financial assistance would save from years and years of struggling. The farmers in the West Moreton district were some years ago placed in a very happy position. As Mr. Burgess has already said, Cribb and Foote never charged a shilling interest for over three years. I took advantage of that and made my sheet clean. Mr. Burgess says he would never again borrow money. I can re-echo his sentiments, for I remember once borrowing enough in ten minutes that took me eighteen years to wipe off.

Mr. A. MOFFAT (Radford): It must be understood that I never for a moment advised anyone to borrow money. We have had a good deal of talking about the dangers of borrowing, but that has nothing to do with cheap money. This cheap money involves a great principle. It is to help those men who by necessity are compelled to borrow money to keep out of the hands of usurers and unfair storekeepers. Because we have these men—I do not say there are many of them. This talk of the disadvantages of borrowing, &c., are away from the subject altogether. I was rather disappointed in Mr.

Gibson's remarks, and, in fact, the only thing good in them was the Gaelic accent. He said some farmers have neither pigs nor potatoes, but might just as well have said that they had no sense. The men he was talking about were not farmers at all. There is no danger in cheap money. The only dangerous cheap money is where the Government send out bad money—paper money—because if you make the money itself cheap, you make labour and the products of labour dear. In this way you may have money too cheap by debasing the currency of the country, so that people who have the money will send it to where products are cheaper. But this does not apply to the arguments contained in my paper, for no man can have a labour-saving machine too cheap. Mr. Robinson has talked about security, but does Mr. Robinson know that in the Western Australian scheme there is no security? A man says, "I am going to take up a piece of land and have £50, will you give me another £50?" The system, I am told, works well. This subject of cheap money is not an original one. There is not a civilised country in the world, except Queensland, that has not its system of cheap money. In conclusion, I may say I liked to listen to Mr. Burgess, as he kept all along to the point, and every word he said dealt with the principle of my paper.

The Hon. D. H. DALRYMPLE: The reader of the paper has not only dealt with the question before us, but has brought in currency, the distribution of wealth, and a great many other matters, which would, each of them, take a lifetime to master. Cheap money is a phrase which means, I presume, something under the market rate. We know very well that money is one of those things which rise and fall: sometimes it is dear and sometimes it is cheap. It is a matter of supply and demand. But I understand that what is meant is, that, under certain circumstances, farmers desire to obtain money on what they believe to be fairly good security at less rates than they could obtain it at in the open market. They do so partly on the circumstance that some precedents have been set in connection with the Sugar Works Guarantee Act, the Drainage, and other Acts, and partly on the circumstance that the security is good, and that the result of the investment of capital in the land is beneficial to the whole of the community. The difficulty in satisfying the aspirations of many farmers is, that whereas the public would sanction only such a scheme by which undeniable security would be obtained, many farmers are not able to give that security. However much people in necessitous positions are to be sympathised with, there are certain lines only upon which money can be lent if the interests of the individual or of the community that lends it are to be considered. I think it is therefore hopeless to imagine that if anyone is overwhelmed with debt he is to be singled out for relief. If a State does it for a farmer, it must do it also for the miner, for the pastoralist, for the business man, who is performing probably some useful function. The first thing is that the security should be good. A Bill was introduced into our Parliament last session by my predecessor. Mr. Chataway had made a study of the question, but he recognised that it was necessary not to depart from certain lines, and those lines were first of all security to the State. That Bill was thrown out by the Council, doubtless for reasons satisfactory to that body, and, although I may differ from it in its wisdom in throwing it out, I cannot quarrel with it for doing what it deemed to be right, and the only result is a little more deliberation. Very often there is more danger incurred by hasty legislation than by allowing a matter to stand over. A similar measure will undoubtedly be introduced into Parliament next session. The State cannot, however, take upon itself the *rôle* of universal philanthropist to relieve everybody from his debts. That would be too great a task to undertake. It may act as money-lender where the security is good, and assist every person who perhaps may be beginning a career advantageous to the State. Money might be advanced, too, for the effecting of certain improvements. Those improvements will be a factor of the soil. Under the principle of the Sugar Works Guarantee Act, the person who desires an advance shall first of all provide security estimated to more than cover the advance. But the great advantage to the State is, that the money which is advanced will then

be added to the value of the land. Therefore, apparently, the State has double the security of the advance. That is, it will allow for a depreciation of 50 per cent., and then the State comes out without being a loser. That is the principle; and knowing, as we all do, the uncertainty of business, knowing that sugar has fallen 70 per cent. in value, within my own memory, a Government must consider the question of stability and security to those whom it represents. There is a danger, too, that should a Government take upon itself the function of money-lender it will be suspected, justly or unjustly, by its enemies at least, of being actuated more or less by political considerations in its modes of granting pecuniary concessions. No matter how upright a Minister may be, no matter how anxious he is to do the right thing, it is possible that he would be accused of refusing loans, not because the security was bad, but because the borrower was a political opponent; and no Minister would care to be in so invidious a position. So it is necessary there should be some buffer which shall be placed between the Parliament which authorises the loans and those who have to receive them. There must be somebody who is outside, and who is admitted to be impartial, and whose tenure of office cannot be disturbed. First, there is the security and the administration placed outside State control, and I think with these safeguards something can be done. I can assure you that all measures the Legislature bring in upon this subject will be carefully studied, and I have reason to hope that, in accordance with the common practice, during the next session a Bill upon these lines, which lines appear to be generally approved of, will be introduced, and, if I have anything to do with it, it will be presented in as finished a form as possible.

Mr. J. E. DEAN moved, and Mr. J. H. MAYNARD seconded, that Mr. Moffat's paper be referred to the Committee of Resolutions.—Carried.

NUT GRASS.

On the motion of Mr. LESLIE G. CORRIE, it was resolved that the subject for discussion on the business-sheet, "The Government to be asked to offer a reward for the eradication of nut grass," be referred to the Committee of Resolutions.

THIRD SESSION.

WEDNESDAY, 12TH JUNE, 1901, 2·15 P.M.

A letter was read from Mr. George Searle, of Toowoomba, offering to read a paper which he had brought to the Conference, but which was not included in the programme.

The CHAIRMAN stated that it had evidently been the practice to refuse all papers that were not included in the programme, and he did not see how it would be practicable to depart from it in the present case. In fact, it would be hard to find time for the reading and discussion of all the papers already scheduled. It was, therefore, regretted that Mr. Searle's paper could not be accepted.

Mr. F. W. PEEK, of the Logan Farming and Industrial Association, Beenleigh, then read his paper on—

A QUEENSLAND CHAMBER OF AGRICULTURE, OR A UNITED AGRICULTURAL SOCIETIES ASSOCIATION.

In introducing this important question to this Conference I may be permitted to explain the reasons for bringing this matter forward. In the first place, it has been noticed that at every Conference that has been held there have been matters brought forward of very great importance for discussion, and resolutions have been passed, recommending to the consideration of the Government or the Department of Agriculture certain reforms or legislation required to deal with the various matters that had been considered and passed by resolution at these annual Agricultural Conferences. And there is no doubt, as members, we went away satisfied that some good would result and legislation follow in the near future; but, alas! in the majority

of cases no action was taken, or, if taken, the desired ends aimed at have not been achieved. This has led me to think that something else was required: a sort of intermediary power was wanted to act on behalf of our societies and associations—a permanent establishment in direct contact with the Department of Agriculture, which would be recognised both by the Department and our societies throughout this State as the authorised body for such purposes; such body I propose to call "The Queensland Chamber of Agriculture." This matter I brought forward before my association (Logan Farming and Industrial) in July last, who fully discussed the question, and finally adopted the motion standing in my name as to the desirability of an institution of that kind; furthermore, it was decided to send a copy of the resolution to all societies that were gazetted in the *Agricultural Journal* at that date, asking for their assistance and co-operation. I am very pleased to state that forty-seven societies responded, promising their support or asking for further information:—

SOCIETIES PROMISING SUPPORT AND SYMPATHY.

Pioneer River Farmers, Mackay; Agricultural Society, Rockhampton; Flagstone Creek (Helidon Association), Helidon; The Isis Agricultural Association, Doolbi Point; Upper North Pine Farmers, North Pine; Central Farmers' Association, Gympie; Burpengary Farmers' Association, Narangba; Wide Bay and Burnett Farmers' Association, Marybororgh; Farmers' Association, Mount Mee; Drayton and Toowoomba Agricultural and Horticultural Society, Toowoomba; Tinana Fruit Growers' Association, Maryborough; Woowoonga Scrub Farmers' Association, Woowoonga; Central Downs Agricultural and Horticultural Association, Allora; North Isis Cane Growers' Association, North Isis; Farmers' and Fruit Growers' Association, Mount Cotton; Logan and Albert Agricultural and Pastoral Society, Beaudesert; Agricultural and Pastoral Society of Southern Queensland, Beenleigh; Pie and Eel Creek Farmers' Association, Gympie; Farmers' Association, Mungar; Council of Agriculture, Bundaberg; Pinbarren Agricultural Association, Pomona; Kolan Cane Growers' and Farmers' Association, Kolan; The Isis Agricultural Association, Childers; Yingerbay Farmers' Association, Yingerbay; Western Pastoral and Agricultural Association, Roma; Farmers' Association, Hambledon; Farmers' Association, Milbong; Dallarnil Farmers' Association, Degilbo; Farmers' and Cane Growers' Association, Gooburrum; Planters' and Farmers' Association, Avondale; Wallumbilla Selectors' League, Pickenjennie; Agricultural and Mining Society, Gympie; with sixteen other societies and associations in correspondence awaiting further action and information.

My association decided also to bring the matter under the notice of the Minister for Agriculture, the late Hon. J. V. Chataway, who went into the question very fully; he personally went through the correspondence, also the draft copy of the rules I had been entrusted to draw up, and gave the movement his full sympathy and support, and also advised the bringing of this question of a Chamber of Agriculture forward at this Conference in the form of a paper, so that it could be discussed. Since then I am pleased to state the Rockhampton Agricultural Society have also had the matter brought forward, and endeavoured to initiate a similar movement in the Central districts of this State. I have received valuable information from Mr. J. J. Miller, hon. secretary of the United Societies Association of New South Wales, who also have a scheme under consideration on somewhat similar lines now being initiated in that State.

OUR PRESENT AGRICULTURAL SOCIETIES' SYSTEM.

I must pay a compliment of thanks to those societies who have responded to the appeal, and who have endorsed the action already taken, and have stated their willingness to assist in initiating a scheme which we feel sure will prove of great benefit to our societies, and help to still further advance our agricultural knowledge and development. There is no doubt that the present society system has been the means of doing a large amount of good in our local districts, and a great deal of credit is honestly due for the assistance they have undoubtedly given towards developing the agricultural industry in the early days, and for which they were primarily organised; but with the inception of the Agricultural Department a deal of work has of necessity been removed from our shoulders, so far as experimental work, &c., &c., is concerned, and a new order of things is required to bring our societies up to date on agricultural work and organisation. How this is to be accomplished is the problem we are now trying to solve. I am sure there is a strong feeling throughout this State that something more is wanting; it has been suggested that various societies and districts might do a deal more good work by co-operating together, or rather by affiliating one with another, and there are good reasons to support this idea, because it is well known that our societies have increased rapidly of late

years, till we find in some districts three or four are now actively working where previously only one existed, and this causes a bone of contention (that is, where such are established), because only one society—generally the first one established, although in some cases practically moribund as regards active work—still draws the Government subsidy or endowment, whilst its *confrères* in the same district, owing to their limited surroundings and conditions, are practically left in the cold, and have to paddle their own canoe in the best manner possible and on their own resources. It might be worth while for the Department of Agriculture to hold an inquiry into this question. One fact we know is, that some better system or basis for the uniform working of our societies is badly needed. Out of the 131 agricultural societies now working in this State there are no two societies working on the same rule, although practically each society aims at the same object—namely, the advancement and development of the resources and products of each district they represent. Therefore, I think I may claim every reason for bringing forward to-day in as simple and plain a manner as possible the benefits to be derived from uniting ourselves together under a representative head, and to be known as the Queensland Chamber of Agriculture.

OBJECTS OF THE CHAMBER.

In bringing this matter forward for discussion the main object is to formulate a general scheme for building up this institution on broad lines and principles that will be acceptable to the whole of our industries—agriculturists, planters, pastoralists, fruit-growers, and dairymen—and by which each industry and society can be represented on the council or chamber when established. And I need not add that the success or otherwise of this movement will depend on its being directly representative. The urgent necessity at the present time for such united action of our societies and producing interests must be paramount to all. The legislation discussed and measures foreshadowed in the Federal Parliament of dealing with some of our chief and primary industries in this State call for and demand the united action of all our agricultural societies and their members to organise and assist in protecting our rights and privileges in such industries that have been the means of our rapid development and one of the chief factors in our State's prosperity. It is only by organising our forces together to help to maintain, not to destroy—to make the troubles of one district the concern of all—that we can hope to succeed in proving to our sister States in this Commonwealth that we are a live body, capable of justifying our position, and speaking for the wants and requirements of Queensland agriculturists and producers.

The chief objects of a Chamber of Agriculture would be as follows:—

- To promote the further development of the agricultural and pastoral resources of this State.
- To watch over and protect the rights and privileges of the various associated bodies or societies.
- To consider and take action in relation to any subject, matter, or legislation affecting them.
- To foster and encourage every branch of farming.
- To safeguard and protect the industries now established in the various districts of this State.
- To obtain proper facilities for the transit of produce and secure the best markets for the same, with the appointment of such agents both at home and abroad as may be deemed expedient.
- To secure a better class of produce for the market, and induce a more perfect system of agriculture.
- To take up the urgent question of agricultural education with technical and practical instruction in State schools.
- To bring about such a union of the various societies and associations as will enable the chamber to bring pressure to bear in any desirable manner for the benefit of the various agricultural industries.
- To bring about uniformity of rules as far as practicable.
- To arrange and negotiate the dates of holding shows, conferences, &c.; also to register and compile a satisfactory list of judges of agricultural products for local shows.
- And to consider, advise, and investigate, in a friendly manner, any and all other items of mutual interest.

This may appear a large order to some present, who have not up to the present time considered this matter or thought out for themselves the many questions that are continually arising at our society meetings; but all these objects, and far more, can be undertaken by a responsible and representative body with every chance of success,

if only supported by our societies, farmers, and others. I need not dilate on the benefits to trade and the commercial world that have been achieved by the energy and work successfully carried out through the operations of the Chambers of Commerce. Measures have been brought forward and advocated, reforms have been actively taken up and legislated for, of great value to the commercial world and trade generally; also, the institution of a Chamber of Mines has been most successful in its operations, and of great value to those interested in mining. Such institutions look after the vital interests of their constituents, and such chambers are looked upon and recognised by the various Governments as a reliable source for obtaining information on matters pertaining to their objects.

Surely, then, it should require no great amount of argument on my part to prove or show the urgent necessity for or the benefits that must naturally follow the establishment of a chamber of agriculture. When we consider the number of societies, the amount of product continually increasing, the vast and unlimited resources at our command in Queensland, we need not hesitate. We have a heritage here which is climatically far and away superior to any other State in our new-formed Commonwealth nation. It is here, within the confines of our boundaries, that the munificent hand of Nature has laid the basis of such agricultural wealth and prosperity as proclaims this State second to none in the world for the variety and capability of products.

The last available statistics I have been able to obtain from the Agricultural Department—viz., 1899-1900—speak for themselves. The figures there given are simply marvellous, and must be a revelation to even our own producers as to the quantities of products that have been obtained in spite of dry seasons and droughts experienced lately. I say such figures speak for themselves. I find the rich tropical lands of the North have produced from 110,657 acres of land no less than 123,289 tons of sugar. The splendid wheat lands of the South have, from 52,527 acres, produced 614,414 bushels of wheat; the vast extent of land in the West, which has brought so much wealth to this State, yielded a return for wool, beef, and mutton the export value of which amounted to £7,025,166. Our rich mineral fields have realised an export value of £3,078,099. Then there are the rich river flats, the long extent of eastern seaboard and coast lands, rich in fertility and luxuriant in growth, which have yielded most phenomenal crops such as maize, potatoes, &c., fruits of all kinds and pertaining to all climates under the sun,* the total export value of our agricultural products being £1,367,502. All this is backed up by our splendid dairying resources, from which no less than 8,462,595 lb. of butter were made, and no less than 1,910,300 lb. of cheese manufactured, whilst the exports of pork, ham, and bacon total 1,040,141 lb., of a value of £31,313.

It has been stated by some that there is no necessity for a Chamber of Agriculture—that we have a Department of Agriculture that could be enlarged, and take up more questions of the day affecting farmers. I think you will all agree with me that there are many questions of vital importance, politically and otherwise, and matters affecting the various phases of the agricultural industry, that cannot be dealt with by the Agricultural Department, but by other departments of the public service, such as roads, reserves, light agricultural lines, railways, freights, &c. These can all be matters for the worthy consideration, and left to a Chamber of Agriculture to advocate if desired. The Department of Agriculture, to my mind, is the most useful branch of the public service yet initiated, and heads the list for the amount of good, solid work, and work that reproduces a hundredfold through its operations, and brings back ever-increasing wealth to this State in return for its practical teaching, sympathy, and education imparted to our farmers and producers.

But this cannot go on for ever. The Agricultural Department holds one of the highest responsibilities in this State, and it is the duty of our local societies and associations to help and assist, and to a certain extent minimise all they can possibly do, by organising and amalgamating together, create ourselves into a representative centre, with the Department of Agriculture in touch and sympathy, focussing the needs and requirements of each district, and by placing them in a concrete form, and in such a manner that will make the task of administering to the wants of our industry and its requirements more satisfactory and less problematical in results. Trusting this will receive your full and earnest consideration, I append rules for your consideration.

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* I might give more detail on the foregoing, but sufficient is given to show our vast agricultural and producing interests and resources, and to call for the full consideration of all concerned in our future welfare to grasp the situation and endeavour, by establishing in our midst such institutions as will safeguard, watch over and protect them, as far as possible, and assist in their further development.

OBJECTS AND RULES OF THE QUEENSLAND CHAMBER OF AGRICULTURE.

Name.

1. That this body be called "The United Societies' Chamber of Agriculture, Queensland."

Object.

2. That the object of the chamber shall be to promote the further development of the agricultural and pastoral resources of this State.

Constitution.

3. The chamber shall consist of representatives of the various societies and associations affiliated, each society being represented by two delegates to the chamber, and that the chamber shall be fully constituted as soon as thirty societies agree to affiliate.

4. All societies subscribing two guineas (£2 2s.) per annum to the funds of the chamber shall become members, and have the right to vote upon all occasions as ordinary members, and any delegate shall be eligible to hold any office or sit on the board or council of directors.

5. The board of management or advice shall consist of twelve members to be representative of the various districts, as follows:—

3 members for North Queensland, Broadsound to Cape York.
2 ,, Central, Burnett River Heads to St. Lawrence.
3 ,, Southern, Point Danger to Bundaberg.
3 ,, South-western, Darling Downs and West.
1 ,, representing the Agricultural Department.

6. A meeting of delegates shall be held annually. The date of such meeting and place to be fixed and decided, in conjunction with the annual conference initiated by the Agricultural Department. At such meeting the annual election of members to form the council or board of advice shall take place, who shall then proceed to elect the president, vice-president, treasurer, and secretary for the ensuing year.

7. The services of the members of the board shall be honorary, or fixed according to rule. Travelling expenses may be voted from the general funds, also funds may be voted to defray the cost of an officer or delegate to visit any district at the request of a contributing society, or for any special purpose in connection with the chamber or council.

8. The council shall recommend and vote annually such sums as may be deemed commensurate with the services rendered by the secretary, but such payment must be approved by a majority vote of delegates at the annual meeting.

9. The board of advice or council shall also be a finance committee, having power to purchase goods, to pass accounts for payment, engage clerical or legal assistance, have full control of the funds, and do all things necessary for the proper carrying out of the interests and intentions of the associated chamber.

10. Seven members to form a quorum at any meeting of the board or council, who shall meet in Brisbane, or other place appointed, as often as may be deemed to be necessary for the transaction of any business that may arise.

11. All business and questions of importance requiring prompt attention, and also those questions the council consider should be referred to the various societies and members, shall be so referred by printed circular, when each society shall record its vote upon the question submitted, and post the same to the secretary without delay. The action of the board or council will then be governed by the majority of votes received.

12. That notice must be given of the desired alteration of any rule, or if it is desired to add any new rule, after final acceptance of the foregoing, which shall be discussed at a meeting of the council, and then submitted to the societies for approval before adoption

13. The annual report and balance-sheet for each year, duly audited, shall be printed and sent to each society at least twenty-eight days prior to the annual meeting.

14. Notices of motion or matters for discussion must be sent to the secretary at least one month before the date of each annual meeting, such motions to be placed on the business-paper for consideration in the order of precedence in which they were received.

15. The secretary shall give fourteen days' notice of meetings to each member of the council.

16. The president shall have power to call special meetings of the council if so desired.

17. A report of the proceedings of the board meeting shall be printed and sent to each society.

18. The association to be registered as "The United Societies' Chamber of Agriculture of Queensland."

The next paper was by Mr. JOHN FIELDING, of the Lockyer Farming and Industrial Association, Blenheim, Laidley, and was as follows:—

AGRICULTURAL SOCIETIES IN THEIR RELATION TO THE GENERAL PUBLIC.

The existing relationship and the regard in which agricultural societies are held by the great bulk of our people are not, to my mind, nearly so close or as respectful as the case should be, and as I believe they might become if we could secure on the part of the societies a more progressive and ever improving up-to-date line of operations, and on the part of the general public (who are at present wrongly regarded as patrons of the societies) a recognition of the services rendered them by dropping the air of patronage and adopting instead a sympathetic co-operation. I hold the view that it is possible to improve matters very much, that ways and means exist to adapt the methods of working our societies so as to commend them to the attention and support of a great majority of our people, and I shall be pleased if my small effort shall induce some serious thought on the subject.

In the first place, we have to note what is the present relationship. It is well known what splendid services to the State, agricultural societies have rendered in every country where they have existed during the century just passed, and it is well to know and to acknowledge the work that our fathers did in the interests of agriculture and, therefore, of the State. And it is well known that the improvement of every branch of knowledge in agriculture has been largely developed by the establishment of agricultural societies. In Great Britain, in 1798, the Board of Agriculture was established and received an annual grant from Parliament. The Bath and West of England Society published its transactions shortly after that date. The Society of Improvers in the Knowledge of Agriculture in Scotland was established in 1723. It is now entitled The Highland and Agricultural Society of Scotland. In 1844 the Agricultural Museum at Edinburgh was aided by a Parliamentary grant of £5,000. The Royal Agricultural Improvement Society of Ireland was established in 1841. These institutions seem to be the original ones that enabled our fathers to compare their products, and incited to emulation in industrial and intelligent agricultural enterprise; and when we think how these institutions have been multiplied, and in their increased capacity, the wonderful influence they have exercised for good the wide world over, we can well afford, as we meet here in agricultural conference, under the Southern Cross, with its differing conditions of agriculture, as sons, many of us, of the old land, and possibly, too, sons of the very founders of the original societies in old Ireland, Scotland, and England—"the United Kingdom"—yes, and it well becomes us to look back with feelings of pleasurable pride, and to unite in paying homage to the memory of an ancestry whose sowings for the public weal have borne such splendid fruit.

But if they did their duty so must we. We cannot live on their reputation. The societies of to-day, if I can judge (and I have had some years of experience with one, and I have made constant inquiries as to others), live a very precarious and uncertain life. As the individual cannot develop a robust and effective life without proper food, so an agricultural society cannot develop a strong useful life to the community unless adequately supported by that community. In the face of necessity, recourse has had to be made to the State Treasury, and, in the shape of endowment on receipts, help is given by the Government, and without this help it would be impossible for any society to carry on its work in the way of offering prizes for agricultural productions that would incite to or secure competition; and while it is eminently right that the State should exercise the power to compel the recipient of a benefit (whether it be the hospital for the care of his sick, or the society for the improvement of his seed, his stock, or his implements of husbandry) to help pay the endowment, we think it would be much better if all the help came voluntarily. Seeing the useful work our societies are doing, one would think there must be good reasons why more voluntary help is not forthcoming and the relationship remains unacknowledged except by compulsion.

According to the conditions surrounding any life, so that life will be vigorous and useful or otherwise, and the conditions under which our societies are working are not of the best, and are producing their natural results. In the first place, the agriculturist as a class is not in touch with the majority of our societies; and if the head of the body is deranged, what else but confusion can we expect? The agriculturist should be the head and a great part of the body too of all our agricultural societies. But on close inspection we find that many societies are agricultural only in name; that, in almost every case, more attention is paid to the general effect as a show-conducting society, the show to consist of jumping and log-chopping exhibitions, &c., and the collection of

exhibits so as to produce a merely spectacular effect. The acknowledgment of patient skill in tilling the soil, in the selection of and production of high-class seeds and fodders, the preparation of the different products for the market, and the improvement of useful stock, are in many cases a secondary matter. And why is this? To my mind, the chief reason lies in the fact that the executive are not agriculturists, and I hold that blood must tell, and so I think that a mere theorist, be he ever so honest and enthusiastic, cannot fill the place of a practical man. Agriculture is to the mind of the general public so *common* that all can understand it, and agricultural products so common that at the shows they are not worth looking at; and so I think, taking the above as the cause, we need not wonder at the effect, as seen in the small number of agricultural exhibits at our shows, and the reluctance of our farmers to take part in the management, when they are classed among the so-called *common* products of the soil, and considered by the well-meaning but perhaps precocious townsman and the bulk of the people at his back as deficient in the ability as he is certainly in many cases lacking in the presumption and self-assurance to push himself forward to claim public recognition. I would be very sorry to speak harshly of the townsman who helps, and who perhaps unconsciously usurps the place and the credit of the work of the agriculturist; but I assert the claims of practical men on the land in everything pertaining to agriculture, and I submit that nothing but absolute supremacy in every branch of administration in the State, as touching the agricultural interest, is just or right. The needs of the agriculturist are best understood by himself, and the dignity of agriculture best upheld by him; and any honour that that great interest has to confer should, I think, naturally be his. Just for illustration: What would the Charters Towers gold-miners, or the Howard coal-miners say if a Lockyer farmer was installed as their representative? And yet practically this is the position of the farmers of Queensland. They are being manipulated to their great disadvantage. They are patronised, it is true, and spoken to very nicely at times, and are told they are very useful members of society, but to be trusted with the administration of their own department, or even to control their own societies, they are not allowed. But, in regard to the latter, they are themselves to blame. They have the power in their own hands if they would use it, and in using that power it is easy to see how they could acquire strength to rectify matters in other places. I bring no startling charges of abuse of power or privilege, but state the fact that, consciously or unconsciously, there has been a drifting with the current, until there is a great necessity for men on the land to act unitedly and take the oars of their own boat, and pull and steer on the legitimate course to continued success.

It now remains to point out how agricultural societies may be managed so as to bring about a closer relationship with the general public and a consequent increase in their power and usefulness in the State. In the first place, every member of the community is more or less dependent on agriculture, and the principle of recognition of this fact is embodied in Government grants, endowments, &c. That fact being acknowledged, the next step to be taken is to uphold the dignity of agriculture by a determination to consider our labour in the field as honourable as any if not more so than any other. If we do not respect ourselves we cannot expect the respect of others. The farmer cannot meet with success without sharing it with others. In that respect he differs from other sections of the community. What he produces goes straight to increase the wealth of the State and to supply the consumer to his benefit. Then, what is more reasonable than to ask that he be treated with respect, and that in his efforts, in co-operation through the medium of agricultural societies, to improve his productions for the mutual benefit of the public and himself, the public co-operate with him. There are many businesses in which men engage and amass considerable fortunes, but they add nothing to the wealth of the State; they merely manipulate the products of others, and do some good. This is true of some; and the good done must be acknowledged; but others manipulate both products and producers, and do very little good and a great amount of harm by spoiling both. I think there are abundant reasons why the agricultural society should receive the active support of every member of the community, and if this were given direct there would be no need of Government help. As to management, I think there is room for great improvements in the management of our societies. There are differing conditions under which societies exist apart from those already mentioned, and each situation and set of conditions must be taken into consideration. A society existing in a sparsely settled country district cannot be worked on exactly the same principle as one having its headquarters in large centres of population; but, generally speaking, the responsible secretary should be an agriculturist. An assistant secretary might well be a resident of the township, but the rest, if business men are included, as they should be, they should at least have a practical knowledge of conditions on the land; then, when matters of exhibits, values,

and conditions, &c., come on for discussion, intelligent, sympathetic decisions will be given. If the society is industrial, as it should be, to unite all classes, representatives of all should be secured; their province is to co-operate to obtain due recognition, but not to dominate; and being the tail to waggle the dog, yet to allow the dog to waggle his own tail. The industrial section of the community may, if they decline to co-operate, or they can, if they choose, form their own associations, like, for instance, the Licensed Victuallers' Association of Queensland; but we hope the example will not be followed of striving to waggle Queensland as a beautifully productive tail sweeping everything before it. It is a fact, too, that societies are worked up sometimes on a fictitious and unstable foundation, and they cannot and will not stand—got up by interested persons, more for the harvest that can be reaped out of the gatherings of the people than for any good intended in the interests of agriculture. Perhaps it may be thought unwise to say such things; but, whether wise or unwise, I deem it right to point out the rocks that mean shipwreck, and discover the canker-worm that would feed on the vitals of institutions that, conducted on honest principles, would be of incalculable benefit to the State. It is possible, in the programme of an agricultural society, to recognise and find a place for every industry in the State; there is no division or section of the community that cannot help, and that would not, under proper conditions, render assistance.

But in many cases, because of some disagreement, an opposition society is started under the name of a dog and poultry society or an horticultural society, and the effect is quite natural—the life of neither is worth saving. Certainly there are cases where the establishment of these is justifiable, but in some it is not so. I find that each man will, as a rule, advocate his own particular interest, whether it be cattle or horses, dogs or roosters. There are exceptions, it is true; but if you get these representatives around a table, and they are honest men, they will listen to the claims of each, and a fair decision will be the result, and division and scanty support and a miserable life of estrangement and poverty would be avoided.

That the agriculturists as a class are estranged from their societies is a fact, is illustrated in the Annual Exhibition of the National Association at Bowen Park, Brisbane, where nearly all the agricultural produce exhibits for the last several years have been drawn from the Lockyer district. The farmers of the fertile Oxley, and Indooroopilly, and Brookfield, and Moggill districts are not represented, so also the residents of the Pines and the North Coast. There must be reasons for this; but the position of the National and other societies existing in centres of population renders them to some extent indifferent to the support of exhibitions. They have the population, and the gate receipts, despite the character of the show, are such as to relieve the mind of the treasurer; whereas if the Lockyer Society failed to secure the sympathy of residents as members and exhibitors, the gate receipts would not pay nearly one-half of their prize sheet, to say nothing of any other expenses. Circumstances must in all cases be considered. But there is one feature in the conduct of both town and country agricultural societies that should be made uniform—that is, in the procedure with regard to donors, members, and privileged persons, &c. It is rather a delicate matter to deal with, but the abuse of privilege, the number of "dead heads" on demonstration days, and the want of uniformity of action is a great source of offence and ultimate estrangement to many honest workers. It is a fact that there are many so-called public or prominent men who never think of sending in their donations, yet look for honour in the shape of luncheon tickets for themselves—and friends in some cases. This may be one of the old customs, and may have been expedient, but it must now be classed as obsolete, and no longer expedient. Even a donor should not expect any such acknowledgment of his donation, which is invariably, in our case, handed over to the winner of it. It should be the prerogative of the committee to honour all who in their opinion it is expedient to honour, and, before the show comes off, to so apprise the individual. There are some individuals who have such an exalted opinion of their value to the community that they seem to think they have only to present themselves at the door of any banqueting-room to gain admittance. Did I not know this, I should not say it, but I have heard it grumbled at so often in an undertone, and watched so long for a public expression in vain, that I take this opportunity of saying it myself. The practice of these undesirable patronages fills the honest, unassuming member with disgust, and accounts for much of the indifference existing.

In conclusion, I think the associations having their headquarters in great centres, such as Brisbane, Rockhampton, and other towns, should help the country societies, and that the country societies, within a certain radius, to be decided on by mutual consent through some central authority, should be affiliated with the central society of their district, and all combine and regulate the different shows. Representation must

in all cases be provided for, and the purely agricultural interest be the leading feature. Great help to the central society in each case, and to the National Association as the head of all, could be rendered by the country societies, and it should be made easy that, at the expression of a wish of the National representative, exhibits from all parts of the State could be sent them simultaneously, to make any display for the State that occasion demanded.

The exercise of such control, and the spectacle of the result of such harmonious working, would have its effect. That effect would be to enlist the sympathy of many who at present are disinterested and stand aloof. The establishment of the district societies' competition has done much to sustain the interest in the exhibitions of the National Association in Brisbane, for the country people go there to see how their collection compares with others. This interest can be greatly increased by a system of affiliation and recognition. Again, I repeat, that for the little I have done I claim no merit, but shall be pleased if I shall induce some serious thought on such an important subject.

DISCUSSION.

Mr. L. G. CORRIE (Brisbane): In speaking yesterday I think I affirmed that, in my opinion, such a chamber as has been described was desirable. In connection with what Mr. Peek has laid down, I am afraid, however, that his proposition is not workable. First of all, I see a great difficulty as regards funds. Of course, I do not suppose Mr. Peek means to be tied down to the subscription suggested. But I see a greater difficulty in this way—that I do not see how business is to be done. I think a chamber of agriculture that would only have a chance of having one meeting a year would be of very little use. Once in three months would be little enough, and that would be very difficult. It would be difficult to get a quorum of seven together. A solution could be arrived at in two ways. One would be, if the associations that now exist were to be sufficiently organised so as to have a constitution or rules that would enable a secretary to be paid. You would require to have one paid officer, and I take it it would be necessary that the executive should practically sit in Brisbane. You might have an annual meeting to which members might come from all parts of the State, but still you would want a continuous executive in Brisbane. From there the measures would require to be treated. They could also be best dealt with from that centre. If started on those lines, even if in a small way, something might grow from it. As the Chairman said yesterday, I believe there are some men in the room capable of undertaking some such scheme of this kind; but I am almost inclined to think that this, like many other things, will, if effected, be the result of one man's work. He will get a certain amount of sympathy. He must start in a small way, but the thing will grow itself. There is such a need for it that I have not the slightest doubt of its ultimate success. There would be the central executive, in which you had confidence, but I am afraid that, with the difficulties in travelling, it would afterwards boil down into the position of an executive that would be more or less composed of men in the South of the State.

Mr. PEEK: We could have members of Parliament.

Mr. CORRIE: If members of Parliament would take it up, so much the better, but I do not think you would arrive at a satisfactory chamber of agriculture with members of Parliament. I hope this Conference will not separate without giving expression in such a way that there will be encouragement to somebody to take the thing in hand, no matter in how small a way, because I am satisfied it would grow and get into the position of being able to do the work that is badly needed.

Mr. W. DEACON (Allora): I agree with what has been said about the difficulties of getting farmers to organise. As Mr. Corrie said, it may be one man's work. After all, however, I do not know whether this chamber of agriculture is exactly what we want. Is it going to be a sort of Trades Hall affair? The subject should be referred to the Committee of Resolutions. They can draft a scheme or submit to us the names of a committee to draft one. They can look through the various papers that have been read upon the subject and see what conclusions can be come to with regard to them.

Mr. G. R. MAYERS (Cairns): I have listened very attentively to the essay of Mr. Peek, and, as far as I can follow, do not think that Queensland is ripe for the department Mr. Peek would like to have established. If such a department were established it would more or less carry out the functions we at present attend to. It would be an annual conference. There would be representatives from every society, so practically it would be similar to the Conference now being held in this hall. I come from a sugar-growing district, and believe that it is the early intention of the sugar-growers throughout the State to try and form an association of their own in order that they may speak with one voice on matters pertaining to the sugar industry, and I think, if the other industries of Queensland were to form associations similar to the one which I hope will be formed by the sugar-growers, we shall get more to the root of the matter. If they are all willing to form associations—say the grain producing or horticultural portions of the community—they will be able to form four or five distinct associations, and out of those associations they could elect their executive; and then I take it, if there were anything affecting the whole agricultural interest of the State, the executives of the several associations could meet together and form a compact body of strong men who would be in a position to make themselves heard.

Mr. E. SWAYNE (Mackay): The organisation of the primary producer has been a subject that my association have had under consideration for a number of years. It is now about five years since we first took the matter up, and we then thought that some central body should be formed. Only a few weeks ago we sent a letter to every society in Queensland asking them to instruct their delegates to this Conference to remain after the regular business was over and endeavour to get such a body in train. It is a matter that requires a good deal of consideration, and, of course, the matter of distance is the greatest obstacle to be overcome. Some of the members of the Chamber of Agriculture will have to travel over 1,000 miles. Mr. Peek proposes to overcome that difficulty by asking the Parliamentary representatives of the different districts to represent those districts on this Chamber of Agriculture while they are in Brisbane. Of course, if the members would take the matter up, and are suitable men, then that might do. With regard to men coming down from, say, Cairns, very often to Brisbane, I am afraid it could not be done. In fact, it is this distance that always does so much to prevent farmers from coming together. Take a district association. The secretary of any town organisation can very likely see some hundreds of his members during an afternoon. The secretary of a country association will, perhaps, take two or three days to get round to all his members. A chamber, however, is necessary. When federation became an accomplished fact, nearly every interest in Australia held conferences, except the farmers, and took some concerted action to advance their interests. There was a conference of protectionists. These came together, discussed the tariff and arranged to exert their influence to get the very best duties they could upon the articles made by them. But the farmer took no interest in the matter, as far as I know, and it is only through some such body as this that he can be heard. One small obstacle in Mr. Peek's scheme is how these large districts, which include interests from, say, St. Lawrence to Thursday Island, are to agree. The league of sugar producers has been alluded to, and the way it overcomes the difficulty is this: The whole coast of Queensland will be included in it. It is proposed to create three subdivisions, and the three subdivisions to have executives. These executives will be represented on the central executive. It will require a good deal of consideration, but, taking the scheme as a whole, I do not think the associations, if they do come together, could find a better investment for the money they will pay in subscriptions to the central chamber.

Mr. A. MOFFAT (Radford): I listened attentively to Mr. Fielding's paper, because he is considered one of the most practical men with regard to agricultural societies in Southern Queensland, and everything he mentions I can sympathise with. Agricultural societies in their relation to the general public should take more notice of this point; they should get hold of the best judges.

I do not think I saw anything finer than at a show at Fassifern, where we had a gentleman who was not afraid to give a decision, and who was not afraid to give a reason for it. There was a big crowd round the exhibits, and there was our friend, Mr. Mahon, of the Agricultural College—for it was he—explaining why the first animal was awarded the blue ribbon, and in what points it was superior to the second. I never saw anything finer as far as educational work was concerned. Mr. Peek's paper is well worthy of consideration, so much so that I would not like to get less than twelve months to consider it. I am in a bit of a quandary now, for I am one of the Resolutions Committee, and it will be brought up before me for action. I really do not grasp the thing. I once had a good deal to do with an institution of this sort. It was called the Farmers and Graziers' Alliance. It was going to be a grand thing, and I remember Mr. D. Jones did a lot of work for it. He put a terrible amount of labour, effort, time, and money into it. And what did it come to? What did Mr. Jones come to? I believe he got crippled over it. In fact, he has never been an independent man since, and has been reduced to taking a Government billet.

Mr. J. W. LEE (Zillmere): I have listened to the papers that have been read, and consider that many of the ideas contained in them are premature. The Chamber of Agriculture, as laid down in these papers, is a big order. From my experience in the country, before we can take up a question of this sort, we have a lot of rough work to do to get the people up to the idea. There are so many different interests all through the State, so far as what we call farming is concerned. I am a fruitgrower and may ask the question, What on earth has the pastoralist to do with the horticulturist? What does he know about fruitgrowing? The canegrowers have an interest in cane, and can form an association amongst themselves, because every man employed in canegrowing knows his business, and they all can unite to work their association in their own interests. But the cane industry has nothing to do with potato-growing, so far as potato-growing itself is concerned. I think, first of all, these various bodies should concentrate their forces among themselves to understand what they need in their own interests. What we want is to focus our powers in our separate interests. When these various associations have got worked up to a standard when they can approach each other for some general good, then I say the time may come when a Chamber of Agriculture will be necessary. But I think at the present time it will be a waste of energy and a waste of money to endeavour to bring one about. It will be better, at all events, to shelve it for another twelve months before we think seriously of it. In the meantime let us work up our separate interests in our different districts until we can look upon ourselves as formidable bodies able to do something in the shape of a Chamber of Agriculture.

Mr. W. R. ROBINSON (Toowoomba): I fancy that Mr. Peek's ideas are somewhat premature. There is one result of federation that we are going to have, and that is keener competition. Our produce will have to be done up in the very best style. Our second-class stuff will have to go down the throats of our poultry, pigs, and dairy cattle, and thus find its way on to the world's markets. To work Mr. Peek's scheme will require a lot of money. If you have to find markets for the farmers you will have to send notices round to all of them; and if one farmer gets his notice of a rise in the market an hour before another, the chamber will be broken up. As for shows, the Lockyer people are very fortunate; and a finer show than theirs could not be found, whether it is held at Gatton or Laidley. It is all very well to talk of judges giving their reasons for their judgments. It might be well enough for a public servant like Mr. Mahon to do so, but I would not care to publicly condemn, say, the second and third horses in a competition by pointing out their faults for the glorification of the first, nor do I think it would be fair to ask me. Judges, however, should give their reasons, in black and white, to the secretary of the show, for the private information of the owners of numbers 1, 2, and 3.

Mr. G. SEARLE (Toowoomba): A great deal could be done with some central body, such as a Chamber of Agriculture, if societies would so far affiliate that

their secretaries could communicate the state of the markets in their different localities to the different societies acting together, the secretaries to make summaries of this for publication in the local papers. At the time of publication a secretary could have about 150 slips run off and posted to the various affiliated societies. A man on the Downs, who has got a good crop of maize to dispose of, goes to a buyer and asks what he will give for it. The reply is, perhaps, that there is a tremendous quantity of maize coming down from Bundaberg, and that, therefore, so-and-so only can be given. The grower, knowing nothing to the contrary, will, perhaps, close there and then, although the storekeeper may only be bluffing him. I know a case where a man had twenty bags of rye ready to put on the market early in the season. A storekeeper offered him 2s. per bushel, which was accepted, although rye was selling at the time for as much as 2s. 6d. If such a scheme as suggested, however, were adopted, it would prevent the possibility of such occurrences, and otherwise do an immense amount of good. I am sorry that Mr. Fielding did not touch upon certain matters that are of vital interest so far as agricultural societies are viewed in the light of educational factors. There are many instances where societies fail in carrying out their ostensible object. Maize, for instance, is a staple product, and some of the finest samples of it are to be seen at our shows, but what information do they convey beyond the fact that good maize can be grown? What ought to be there, to teach the farmer anything, is the name of the variety, its height, when it was sown, when it was harvested, and, more important still, whether it is suitable for late or early sowing, for there are kinds of maize admirably suited for spring crops, but which are failures when sown for late crops, and *vice versâ*. If it were made a condition that an exhibit which obtained a prize should bear its correct name and the information I have suggested, then the competition would be educational. A collection of apples was exhibited at a late Toowoomba show, and amongst them was a variety described as Uncle's Favourite. A gentleman who was pleased with its appearance came to me for some trees of it, but as I had never heard of such a variety as Uncle's Favourite, I made inquiries, with the result that I found the apple was really Trivitt's Seedling. Supposing the exhibitor had fixed the name Ribstone Pippin to this particular apple, and a novice, on the strength of it, ordered a dozen Ribstone Pippins from a nurseryman. When the trees came into bearing, he would find they produced an apple totally different to the one he had been led to expect.

Mr. T. de M. Murray-Prior (Maroon): I should like to say a few words on Mr. Fielding's very able paper, and those are on the subject of judging. I cannot agree with Mr. Robinson that judges should not give their opinions publicly. If people send stock to shows they must be prepared for criticism. They should not send stock to shows solely for sale, but should send a beast there to compete on its merits. If judges are fit for their position, they should be prepared to state their reasons for their decisions. Until that is done, we shall not have as successful shows—that is, successful from the educational point of view—as we might have. It is a pity that some method cannot be started whereby competent judges can be nominated for all our shows. Mr. Moffat has explained to you Mr. Mahon's method of judging at our Fassifern show, and I think every judge ought to be prepared to follow that example. I feel very strongly on the subject of Mr. Peek's very able paper, for I appreciate keenly what we producers lack in combination. We are wanting in organisation, and, as Mr. Deacon said yesterday, while we are lacking that, we shall not progress as we should. Here we are at the fifth meeting of the Agricultural Conference, and if we are not educated sufficiently by this time to have a chamber of agriculture we have done very little good. I think myself that we are quite fit for it, and that we ought to formulate a scheme for inaugurating it. Mr. Peek has, perhaps, been a little ambitious, and has tried to fly too far. It would, perhaps, be better if we proceeded slowly and approached the subject in the proper manner. In the first place, Mr. Peek has not dealt with the way in which we should get the funds for the suggested

large organisation. When we start a thing we must have funds, and to get funds requires time. Mr. Peek's idea of having twelve delegates is a good one; but why not nominate these delegates here? Why should not the Committee of Resolutions bring forward a scheme by which these delegates could be nominated here? We have here members from practically every part of Queensland, and from amongst them we could have representatives meeting again in a few months, provided the different societies joined together and were willing to subscribe the two guineas apiece that has been suggested. Mr. Peek mentioned thirty as a minimum. I hope there will be more than thirty, but thirty would give us sixty guineas. Then, if the Government would furnish railway passes, the amount of delegates' travelling expenses would not prove so excessive as some appear to imagine. I certainly think we could elect delegates here to-night to meet again in a few months time.

Mr. J. J. DANIEL (Pittsworth): Our industry is generally called the backbone of the country, but this backbone in many cases appears to be without marrow, or, in other words, without life. I was not in accord with the speaker who contended that there was no level upon which we could all stand. We get our life from the land, and we are all producers. Our industry is alive at this Conference. It is alive at our shows, alive at our ploughing matches; but it is scarcely alive when we call our public meetings or our members' meetings. It seems to be partly dead at those times and partly alive. It is alive on these occasions in the person of the president, the secretary, and, perhaps, barely a quorum of a committee.

The Hon. ANGUS GIBSON: The discussion on the papers has been very interesting, and some of it puts the minds of gentlemen like Mr. McLean and myself back a good many years ago. I was thinking, when this discussion was going on, of the necessity for more organisation, of the meeting I went to, somewhere in 1866. We got inside of a four-rail fenced yard, and sat on the rails while a few other gentlemen were speaking. In that yard was inaugurated what was generally known for a great many years as the East Moreton Farmers' Association. From that organisation a meeting took place on the Logan. We organised further, and plenty of other meetings took place long before much of the country was opened up that the speakers have referred to this afternoon. I like to look back to the beginning and see how it is working out. I remember when Mr. McLean and myself went to work up the meeting at Beenleigh. We had a jolly time, although we were both teetotallers. We have lived to see the thing move on, and I am delighted to see here to-day some 150 gentlemen from all parts of Queensland representing over eighty different associations. This is a mighty force, but there is one weak point: The difficulty is to get at that majority outside—the men we are working for, the men that we are striving to advantage. We want to make the little societies strong. It is very pleasant to know that we have men like Mr. Peek, who aspire to see these farmers' organisations taking up parliamentary action of their own to govern the whole of the agricultural and pastoral interests of the State.

Mr. J. H. MAYNARD (Gympie): The subject for discussion on the business-sheet for this afternoon is the establishment of a Central Chamber of Agriculture which has been put there at the instigation of my association, and I may explain this was done in support of a circular sent out by the Logan Farming and Industrial Association. When that subject was discussed at our meeting it was received enthusiastically, and it was felt that every society in the State should support such a movement. When we come to the question of societies, it appears to me that in Queensland we have really two classes of farmers' associations. One, usually called "The" association, whose chief business is to hold a show; and the other is a very small society—the farmers' association. The centre of the first association is in town, and generally the principal people interested in it are business men. It is largely a town show. The farmers are asked for support, and they invariably give it. The second society has various names, but it has one chief object, and that is to discuss

matters absolutely interesting to the farmers in the district. A great difference between the two associations is, that the first has generally funds. It has an income from the show and a subsidy from the Government. The total amount of the subscriptions of the small society does not total £50, and it, is therefore, not eligible to receive a subsidy. When we come to a Chamber of Agriculture, if two guineas were insisted upon—and I do not see how it could be less—the two guineas would have to be raised by the enthusiasts who are carrying on the small associations. If we can get some way of raising funds without coming too heavily upon these small associations, and without cutting them out if they cannot give a subscription, it would be a great advantage. When there is any special subject of interest or when there is some point that we feel will bear heavily upon us, we will then all roll up to a meeting to hear it discussed. It may be state of the roads or the ticks. We are all brought together, but when that matter is settled there is a great falling off, and it is left to two or three to carry on the work. I am afraid that unless we can get some cement to keep the associations together, if they do combine, that there will be a falling off in interest after the first enthusiasm is gone. A cement that will do good is a little co-operation—that is, co-operation for our practical benefit. Many can recollect the movement of 1883. The co-operative society then formed fell to pieces, but the main fault was that the members wanted to get district representatives instead of the best men. I believe, however, that if the men who afterwards became directors of that co-operation, had the experience they now have, it would have been successful.

Mr. F. W. Peek (Loganholme): I have to thank you for the reception you have accorded my paper, but I am sorry to say that it appears I am a bit premature. Perhaps I am, but someone must start the ball rolling. At the last three Conferences I have been told that I am premature. I introduced agricultural education at Mackay, and was told I was too premature. My Agricultural Bank Bill at Warwick was too premature, and now my Chamber of Agriculture is too premature. I hold, however, that it is not. If we can only, from this Conference, form a nucleus from which we can grow, we shall have attained a certain end productive of good, and I shall be satisfied that I have done some good in introducing the subject. We are all agreed that organisation is required. I myself have been in communication with the National Association of Queensland on this matter. Reference has been made to the National show, and the Logan has always done its best to assist that body. I feel more flattered this year, although we only won third prize as compared with the first of last year, because of the stronger competition, and because it has set our fellows' backs up for a bigger show next year. It is only by organising our forces and showing what can be done that we can succeed. What better field could we have than the annual show of the National Association? It is recognised as the chief medium of showing the progress of the State. The only thing wanted now is to induce the outside societies to enter into the competition. The society has enlarged its coffers, and I must say that these national exhibitions have been the means of introducing a lot of good into our districts. I am sure if every member could bring home to his society the advantage of contributing to the districts' competition at the National show, it alone would more than repay the cost of these Conferences. Mr. Corrie said it was difficult to get men together. I have given the council twelve men, but there is nothing to stop having three councils, one each in the Northern, Central, and Southern districts. It is no use being divided because one man breeds pigs and another grows pineapples. There is affinity between even those industries. Cheap agricultural lines are required throughout the State, whether by the pigbreeder or the pinegrower. A Northern man wants a thing, but by himself he is not strong enough to get it. We in the South can, however, help him. The question of funds has been raised. I do not believe in State aid. Some of the money voted to agricultural societies at the present time, however, could be better devoted to a chamber to do such work as I have indicated. I do not see much argument against the idea of the State

assisting a Chamber of Agriculture. Of course, the two-guinea payments appear to be small, but the amount of work that at times can be done by honorary men is very great. In the Logan Farming and Industrial Association we have several branches emanating from us, and we now find that on certain matters we can speak with more force, and that we have more power with the Department. So I say that, if we focus our wants together, we can approach the Department with the knowledge that we have the consensus of the whole of the State at our backs. I hope we shall have a meeting, and form the nucleus of what eventually will be the Chamber of Agriculture of Queensland.

Mr. JOHN FIELDING (Blenheim): As Mr. Burgess said last night, I cannot understand why we come here to preach division. All the agriculturists of the State should see that they stand together. That is why we are here to-day, and we must acknowledge the wisdom of the Agricultural Department in initiating these Conferences. I hold it was in the minds of those who started them to get the agriculturists to work together, so that the sugar-grower might be able to understand, as we know he does, some of the difficulties that beset other producers. We are surely charitable enough to wish to bear each other's burdens to the same extent. I think we ought to encourage small societies, if small societies solicit our help. We can all help the National Association, as we are doing now, and make its annual show a highly educative medium for those who have not the opportunity of going through the country. The idea referred to yesterday of having exhibits tabled at the monthly meeting of the small societies is a very good one, for the majority of farmers are always willing to learn. I thought when I visited the Agricultural College, on one of those occasions when a big party journeyed to the College, that it would be interesting and instructive if the visitors brought with them samples of agricultural and dairy produce, which could be displayed on long tables at the institution. People would look forward to it, and it would increase the usefulness of these now popular visits. I cannot agree that the idea of a Chamber of Agriculture is premature, and, having in view the necessity for agriculturists to combine, it is high time something were done in that direction, and I hope before the Conference closes something definite will have been effected. I am sure Mr. Peek has the best interests of the agriculturists at heart, and I hope we shall all see our way to give him some measure of support.

The Hon. D. H. DALRYMPLE: The debate that has taken place has been on the relations of agricultural societies. First of all, there is the relation which it is desirable to establish within the societies; and, secondly, the relations referred to in Mr. Fielding's paper, that should exist between the societies themselves and the outside public. Mr. Fielding draws attention to the fact that associations have a tendency to fall into the hands of townspeople. That, however, is from the nature of things. As one who has lived in a country district, I know it is inconvenient for country people to visit towns at night. The roads are not, perhaps, excellent. We are compelled to leave much of the management of our societies to the townspeople. With regard to his views relative to the committees which deal with shows, he said a great many of the public attend those shows very frequently in order to see spectacular displays, in order to view jumping, in order to look at log-chopping—matters which were, perhaps, not strictly agricultural. I am afraid the experience of all of us will force us to admit that the committees, whether composed of townspeople or agriculturists, must do those things which are necessary to obtain large attendances. A large attendance is desirable for two reasons: First of all, that the public may come and view the agricultural exhibits; and, secondly, in order that the show may pay. It seems to me that, unless human nature alters very much, we shall be still compelled to study the taste of the public. We cannot alter it. We may hope they will prefer to look at fruit rather than at a horse jumping, but I am afraid it will be a long time before such a change takes place. In the meantime we have to do the best we can to make these shows financial successes.

There were some other matters which were alluded to by Mr. Fielding: that there were members who got dinner tickets who should not get them, and that there were men who did not consider labour honourable. Doubtless those statements are correct, but the fault is in the individual. If a person does not consider labour honourable, all we can do is to pity him. Some interesting views have been elicited on the subject of organisation. It appears to be unanimously considered that it is desirable that some kind of organisation should take place. But a few seemed to think that for some reason it was not practicable, and so they would recommend that it be shelved. This organisation, when it does take place, is expected to deal with a great many problems, some of them commercial, some educational, and some political—by which I mean that a portion of the community, who are agriculturists, should be able to apply a more direct pressure in Parliament. If these things are to be dealt with by an association, it is very evident its functions will be extensive. It is evident that a considerable amount of money will be required. That money must be obtained by levies. I do not think that contributions of two guineas will anything like suffice, and it is owing to so much money being required that there has been no direct representation of the farmers' interests in Melbourne when the important question of the tariff was being considered by independent bodies. The reason undoubtedly is want of funds. But you will find a great influence is exerted in Victoria by what is known as the Country Party, and the members of Parliament there have to do what members of Parliament have to do in Queensland. Members of Parliament are practically elected because they have the confidence of the large majority of the inhabitants. So the agriculturists do exercise an influence, but it is exercised in Brisbane. Whatever arrangements the agriculturists of the State desire to make, those arrangements will all lead up to a committee who must meet in Brisbane. That, it seems to me, is inevitable. The committee will have to deal with very large matters indeed, and it will cost a good deal of money. Schemes have been set forth by several gentlemen which are very sound, but what I want to place before the Conference is this: If it is desirable to appoint a chamber, how necessary is it to appoint at the present time a committee to make a beginning or to sketch out or to submit some plan? And I may say that, whatever may be the difficulty, it is nothing like the difficulty with which you will be confronted whenever you endeavour to form a chamber and finance it. I venture to say you will never have a better opportunity than the present of appointing a committee. You cannot get a better representative meeting of Queensland agriculturists than the one now here. I would suggest that a committee be appointed, before the Conference dissolves, to take this matter into consideration, and to make a recommendation as to whether an endeavour should be made to carry out this plan at once or whether it would be better to deal with it on another occasion. I am sure that, if a small committee is instructed to carry out a certain business, it will be more successful than a large body, if you want something done. If an executive is to be appointed, that executive must consist of a few members. If you delegate this matter to a committee you will probably get the matter in a form in which the Conference will very easily be able to digest it.

Mr. LESLIE G. CORRIE, of Brisbane, then read the following paper on—

CONFERENCES AND THEIR VALUE.

That's the appropriate country; there, man's thought,
Rarer, intenser;
Self-gathered for an outbreak, as it ought,
Chafes in the censer.

—R. BROWNING.

There are people holding the opinion that a Conference is simply the official name for a junketing under the ægis of which certain favoured individuals secure a good time at somebody else's expense.

The author's experience may have been exceptional. It has certainly only been with cases where there was a comparative absence of officialdom—that is to say, with

Conferences practically dominated by independent men whose work-a-day lives were a sufficient guarantee that earnest business was to the front or they would not have been present.

At the gatherings referred to so much hard work was put through, indeed, that this question kept presenting itself—How much payment would the men who are here gathered together require before they would work such long hours and put forth so much enthusiasm as a matter of everyday business? Probably the doubt in the minds of some as to the utility of such gatherings could be readily traced back to a lack of acquaintance with the question, or, perhaps, to the absence of any immediately practical results being apparent. Were it only possible to get some of the labour and anxiety of a Conference on to the shoulders of the sceptic himself, he who came to sneer might remain to praise.

Those present to-day who have taken part in previous Queensland Agricultural Conferences will know a current of sadness to be running beneath the whole proceedings owing to the lamented absence of the late Minister. All will remember how heartily he entered into the business and how satisfied he showed himself to be as to the value of the work done, and the necessity for such gatherings; and yet, prior to Mr. Chataway entering the Cabinet and getting into touch with this phase of work he was—as repeatedly expressed to the writer—much inclined to question whether any return, at all commensurate with the time and cost involved, was ever returned from such meetings.

So far as Conferences are concerned, it is to the United States that we must look for the most intelligent appreciation of their value.

The minds of average Americans travel upon essentially commercial lines, so the fact was quickly grasped that by actual face-to-face meetings education was possible in the most expeditious way.

By the agency of the printer, of late years especially, wonderful educational facilities are placed within the reach of every men on the land. Only those who have studied the astonishing publications issued by the Government and also privately, in the United States, can have any idea of the exceptional advantages in this direction enjoyed in that country. Yet in the United States, to a greater extent than elsewhere, it is recognised that the most practical and rapid way to solve many questions is by the bringing together in conference of a variety of men's minds in order to benefit by their stored-up experience.

It is arguable whether any more eloquent exposition of unselfishness can be found than the willingness at these gatherings upon the part of writers and speakers alike, to make the best of their knowledge available to everyone, including their own direct opponents in business.

In this connection an amusing experience fell in the writer's way one night, when dining in another colony, at the house of the Secretary for Agriculture, at the conclusion of an Intercolonial Fruit Conference. One of the guests, after listening for some time, in evident growing uneasiness, to the conversation, asked if he heard aright? If at the Conference practical information was *really* given by one delegate to another? Being assured that this was so, that the conference was openly educational, and all the papers read and attendant discussions designed so as to throw the greatest amount of light upon the various subjects, he, evidently losing all patience, delivered himself excitedly as follows:—"Well, this is simply the most amazing and idiotic thing I ever heard in my life! You say, for instance, that Tasmanian apple-growers are willing to explain for the benefit of their New Zealand rivals just how to produce the best and most payable fruit, how to keep pests away from it, and how best to gather, pack, and ship their commodity to compete in the same markets! Why, these men must be all mad! They have not the most rudimentary notion of business training! I am a merchant interested in soft goods. Well, what do you think would happen if anyone came and suggested that I should supply information concerning my method of indenting, sales, or book-keeping, or post him concerning any of my failures or successes? What would happen, gentlemen, would be this, provided always that my enterprising visitor weighed less than I, he would be immediately fired out on his head!"

The cases, of course, were hardly on all fours, but it should be remembered in favour of the agriculturist—who is admittedly on many points one of the most conservative of men—that in this matter of disseminating his experiences he comes on to quite broad lines. Now, this desirable state of affairs has been brought about mainly through conference facilities, under which farmers are brought together, ensuring that interchange of ideas which leads to dissipation of narrow notions.

Fortunately, men of wider views than the soft-goods man referred to are not uncommon, and, reducing things to their most selfish aspect, if a delegate supplies an

item of valuable information to a rival or brother grower, his own system must be strangely perfect, or those he meets very barren of ideas, if he does not himself secure in return more knowledge than he was able individually to impart.

At a Conference, men, in a manner hardly otherwise possible, can get to know of methods desirable to follow, or, what is of no inferior value, of measures to be avoided. They are able to elicit specific information and to have the same on the spot traversed, corrected, or supported by others; can learn why such or such a course, in their own case, led to comparative or total failure, and it is to be hoped will in return chronicle their special experiences. A well-ordered Conference, including amongst those present men well up on the subjects under discussion, provides a wide range of knowledge to be drawn upon, so that one man's work, observations, and deductions can be endorsed, corrected, or carried further by what other men know.

Should the State or district where the Conference sits be selected with educational intent, much invaluable information will be gained from the fact that the object lessons presented will be seen under the very special advantages of having them in review at the one time by many minds capable of mutual assistance in the endeavour to get the utmost reliable educational lessons from the inspection.

The same remarks apply to the lessons taught by any show held while the Conference is sitting.

The more introductions secured, acquaintances gained, and channels of communication opened up, count for something, while the information derived from, and given to, brother workers owing to the facilities afforded for private conversation and interchange of ideas—altogether apart from the direct work of the Conference—can hardly be placed at too high a value.

Instances could be quoted of an entire change for the better in the mode of a man's life work, owing to these gatherings—of trade-routes exploited, and extensive business connections secured and satisfactorily maintained.

Knowledge gained as to the conduct of work in other parts of the continent or State must broaden the mind and prove helpful to even the most advanced in any line of business.

There is nothing more practically educative than the eye. By the medium of Conferences men have been constrained to travel and inspect at first hand, as they would not otherwise have done.

Who can doubt were our manufacturers, dairymen, fruitgrowers, &c., all shipped over sea, say to Europe and America, to inspect for themselves the methods in those countries adopted, and have the advantage of personal discussion with the men conducting those interests, but that immense good would result to the industries of this State?

Life is too short for a man in this twentieth century to find out everything by his own experiments. The pace of to-day demands that no avoidable mistakes should be incurred. The poet sings that we are "heir to all the ages," which, practically applied, reads that the other man's experience should be pressed into our service. Now, this is just what a Conference aims at, and, if well organised and conducted, secures.

Leaving the discussion to bring out what more remains to be said as to the value of Conferences, the author will pass on to the consideration of some leading principles which his experience has shown it is desirable to follow to secure a maximum of good out of a Conference.

Leading lines generally applicable to Conferences might be laid down, but, according to individual, special, or local environment, certain material modifications would be necessary.

It will suffice for the purpose of this essay to deal with one class of conference only; and, as familiar to most of those present, to select, say, a horticultural one as an example.

The supreme authority in the case of such a Conference might be the Department of Agriculture in any State or some leading association or society in any State or district.

Let it be assumed that the Conference about to be considered will be held under the auspices of some prominent horticultural association.

PRELIMINARY.

The association will properly have chief say as to the nature and control of the Conference—

1. It will lay down the lines defining the extent and scope of the Conference.
2. It will decide when and where the sitting will be held: Preferably, a time and district will be selected ensuring good attendance, and affording local object lessons so far as possible pertinent to the Conference programme.

3. It will set forth the subjects for discussion: Preferably, these will be few in number, and as cognate in nature as possible.
4. It will settle upon the number of essays to be prepared, and the length of the same: Preferably, essays will be few in number and of restricted length—say, not exceeding a certain number or words, allowing, say, a 10 per cent. or 15 per cent. margin to the author.
5. It will decide which sub-districts or societies shall contribute essays, and intimate to those controlling the selection of writers the necessity for choosing such as are well qualified to submit informative matter and such as will ensure good discussion.

So long as full discussion is secured, the merit of the essay itself is not always of such high importance, it being often more valuable to expose a fallacy than to endorse a truism.

Few and short essays and a full discussion are preferable to many or long essays with a meagre discussion. An essay often gives only the experience and opinion of a single man, whereas the discussion may elicit the opinions and knowledge of a score of minds.

PROCEDURE.

The Conference will be under the control of such chairman or president as the association may announce, or, in default, then of such chairman as the Conference may select upon the first meeting of delegates.

The chairman's decisions will, upon all points, be absolutely final.

The chairman will have no deliberative vote—only a casting one in case of a tie.

After the chairman is seated, and before proceeding to other business, the following will be decided:—

1. How votes shall be taken.
2. What the scale of voting will be in the case of representation by States, districts, or societies.
3. The times and hours for the sittings of the Conference. In the case of delegates being present from scattered districts, it will be desirable to arrange so that an afternoon or evening at least will be kept clear from the work on the syllabus to enable delegates interested in any sectional matters to have the advantage of meeting and discussing their particular interests amongst themselves.
4. Appointment of sub-committees and their conveners; also of judges, should a show be connected with the Conference.
5. Decide the order for taking the business, should any change from the order of the syllabus be desired.
6. Fix the order of debate—such as the duration of time for speakers, &c.

ORDER OF BUSINESS AND DEBATE, &c.

Each delegate will speak once only upon each subject, and no longer than the limit fixed—say, five minutes—unless a majority vote gives permission.

The chairman will either be allowed to speak for five minutes to the subject after the rest of the discussion has closed or will have the privilege of briefly summing up after the essayist has replied.

Each speaker will stand.

Each delegate, every time rising to speak, will announce his name as well as the name of the State, district, or society he represents. This information will be repeated distinctly by the chairman for the information of others present.

Each essayist will read his own essay, and while doing so will stand in such position as may be directed by the chairman, in which spot he will also stand when replying.

Should the essayist be unavoidably absent, the chairman will appoint a substitute to read the paper.

In the case of any essayist not being a clear reader, the chairman will endeavour to substitute someone else to read.

Preferably, each essay will be discussed as soon as read. If essays read and discussed in groups—which is much to be deprecated—then each essayist will be allowed to take part in the discussion upon the essays other than his own.

If essays grouped, then only those of the very closest relationship will be put together. The discussion will largely fail if this is not strictly attended to.

Reasons against any grouping of essays are—that a most valuable paper may get too little consideration. A delegate speaking upon a group of essays seems somehow impelled to refer to each of them, so that the end of his time limit is reached while he

has still valuable information to give or criticism to make. Manifestly, for the most practised speaker, five minutes are quite brief enough within which to do the barest justice to a single essay or subject.

If any essay or group of essays, including any discussion in connection with the same, be not finished at the time fixed for the end of the sitting, then the sitting will be adjourned, and the unfinished business will be the first taken when the Conference reassembles.

All notices will be in writing, and include the signatures of mover and seconder.

Notices of motion will be received by the chairman only at the conclusion of the business in connection with any essay or group of essays.

Any notices approved by the chairman will be read aloud to the meeting and submitted to such sub-committee as the Conference decides.

Any sub-committee will, as soon as possible, take into consideration notices of motion and such other business as may be relegated to it, and bring up a report upon the same at the earliest date.

Reports from any committee will be brought up as a first business to the Conference at any sitting not being an adjourned one, and at an adjourned sitting as soon as the adjourned business is completed.

Voting by the Conference upon any resolution or business submitted from any committee will be, at the chairman's discretion, taken either at once, or at the close of the sitting, or at such later time as he may decide and announce.

Whether finally submitted resolutions shall be open for debate or not must be decided by the Conference. If debated, then restricted time limits for speakers should be enforced.

ESSAYS, &c.

The association will only receive essays subject to its right to approve or reject.

Essays will be delivered to the association, say, three weeks before the Conference to enable such inspection to be instituted as to ensure any of an unsuitable nature being excluded.

To secure thorough discussion, essays will be printed and copies placed confidentially in the hands of such delegates as may be interested in the particular subject treated on in the essay, and who may ask for the same, one week before the Conference opens.

Essays read at the Conference will be the sole property of the association until officially published. If no publication within six months, the authors to have permission to publish.

Publication of the contents of any essay by the author prior to the Conference will render the essay open to rejection at the chairman's discretion.

No essays beyond those scheduled in the syllabus will be taken into consideration at the Conference.

No essay to be read unless it is considered there will be time for discussion.

Unless discussed, no essay will be published in the proceedings.

A syllabus detailing the scope of the Conference, along with a list of the essays and names of authors, will be placed in the hands of accredited delegates—say, two weeks before the Conference.

MISCELLANEOUS.

Should the association have connected with it any officers or members with scientific attainments or possessing special information relative to any of the subjects under discussion, then such officers or members shall be nominated to attend the Conference.

Whether accredited delegates or not, such officers or members will have the right to take a full part in the business of the Conference, but, unless accredited delegates, will have no voting power.

If possible, one evening should be devoted for the delivery of a lecture by some competent authority upon some subject cognate to the Conference business or of general interest to delegates. At the conclusion of the lecture a short discussion to be instituted, or at least permission given for questions to be asked by delegates.

A question box will be a feature of the Conference. Each question will be in writing, with the name of the querist attached.

Chairman to decide whether any question is relevant, and whether it shall be considered or not, also who shall answer it.

Box to be opened and the questions dealt with, should there be time, before the close of any sitting other than an adjourned sitting, or otherwise immediately preceding the commencement of any new business at any fresh sitting.

GENERALLY—CHAIRMAN, &c.

While much depends upon the chairman, the success of the proceedings in practice will lie in the hands of delegates themselves.

The chairman's position is no enviable one. When the business is through—like the umpire at a football match—he will have borne the main burden of the day.

Many of the duties involved being of a delicate nature, unless the chairman gets loyal support from all present his position will be unfairly trying.

While the formulation of the Conference lies with the association, the chairman will have under his direction the primary important discussions.

All present should earnestly try to elicit the utmost amount of information on each subject.

Much loss of time will be avoided if delegates—

(*a*) Would not speak unless having experience in the subject under discussion, or unless desirous of securing information.

(*b*) Would consider beforehand what they wish to say, and then say the same as clearly and tersely as possible.

(*c*) Endeavour to speak closely to the question.

While a discussion on a discussion is to be deprecated, sometimes it happens in this way the most valuable points can be brought out.

At a Conference strict rules of debate cannot be always slavishly followed.

The chairman can only to a limited extent guide the debate. He will require to act firmly at one time and with a fairly elastic rein at another, in order to get the best results, and to this end it is necessary that he be capable of quickly gauging the individualities of delegates.

Horticulturists are sometimes a little difficult to handle. They appreciate neither coaxing nor driving. Though for his own special benefit, the man who does not hear very well has to be cajoled up into a front seat. Those who can give hints of the most value are often very diffident about speaking, while a man of shallow attainments may wish to talk all along the line.

How often, too, are instances seen when the item of greatest value in the whole discussion was only given forth by a man after he had nearly exhausted his time limit with a mere repetition of things already said or well known.

The two bears are very welcome guests at a Conference. No room should be made for politics at a Conference.

SHOWS.

Whilst a show will throw heavy extra work upon some delegates, for the reason before given it is very desirable to hold a show in conjunction with a Conference.

Exhibits should include those pertinent to the work of the Conference.

Exhibits of up-to-date horticultural machinery, appliances, processes, and manufactures should be made a feature of the show.

Certificates of merit are preferable to money prizes.

In most cases single judges are preferable.

For educational purposes—where there is no ill-feeling or dispute between exhibitors—at the chairman's discretion, the reasons leading up to the judges' decision are to be given by the judge if desired by the Conference.

No conference work should take place the evening before or on the morning that the show is opened.

DISCUSSION.

Mr. J. MCPHERSON (Rockhampton): I have no doubt that Conferences are a great value, provided they are carried out properly, and if recommendations which we may make are taken notice of. I do not suppose that any recommendation that is not practical can be dealt with practically. There was a Conference in Rockhampton some three years ago. There were two sections, the farming section being presided over by Mr. Chataway, and the stock section by Mr. P. R. Gordon. At the latter we submitted several recommendations, and, after discussion, these were passed and recommended. Amongst other things dealt with were the Marsupial Destruction Act, the tick question—which at that time was a live one—the Noxious Plants Act, and many others. We never heard what became of those recommendations I made inquiry some time ago in Brisbane into the matter, and found they had been pigeon-holed. But the recommendations that had come from the agricultural section were dealt with, so I understand. If that is how recommendations are to be treated, I do not see the use of Conferences. I thoroughly believe in Conferences, however, if their recommendations are properly attended to.

Mr. W. P. Cooksley (Brisbane): I need not say I am pleased with Mr. Corrie's paper, as it is just up to date. He and I have travelled to many conferences together, and I think he has hit the right nails on the head. Personally, the knowledge I have gained at Conferences is very great. There is one matter which Mr. Corrie brought up, and that is, that the essays should be printed and distributed at the time of the Conference for the information of the delegates. This is a matter of great importance, because, under the present circumstances, we are not in a position to be able to properly discuss the papers that are read. If the papers were printed and distributed, we could then go through them carefully, and we would then have a much better discussion. We could criticise them more freely. Another point brought up by Mr. Corrie was, that the discussion on the various papers should take place after the reading of each individual paper. That is a wise contention, for, when we hear three papers read one after the other, we lose the trend of the first in listening to the last one. If we had the papers printed it would not be so bad. I am thankful we have not heard them all read together at this Conference. Another thing we have gained at this Conference is, that the persons reading papers on the same subject as other writers are allowed to discuss those persons' papers before they come to their turn for replying to the remarks on their own. We have to thank our Chairman for the blessing. Conferences, as a whole, are a great benefit to all agriculturists, no matter whether they are fruitgrowers, wheat-growers, sugar-planters, or otherwise. They get a vast amount of knowledge from them. I was at a Conference once when a paper was read upon tomato-growing. We all think that tomato-growing is very simple—that you have just to plant the seed, and up comes the tomato. Now, I gained at that Conference a point about tomato culture which I was not previously aware of. We used to allow the woodbuds to grow until further orders. But we learned there that it was the correct thing to take away the woodbuds. It is only a matter of pruning, but a great many people never knew it until that Conference. The best thing ever instituted by our Department was the inauguration of these Conferences. I am of opinion that, when these Conferences go on a little bit further, the question which was brought up previously with reference to a chamber of agriculture will soon have force. I should like to make an explanation with regard to valuations for central mills I based my valuation of a certain portion of land I was speaking of upon its commercial value, since which I have discovered that the Department does not work out its valuation upon that basis. It bases its valuation upon what would be the output of cane. Therefore, I must retract what I said about the values allowed for, being above the value of the land. When I made my statement this morning, I was under the impression the commercial value of the land was considered.

Mr. J. H. Maynard (Gympie): I think Mr. Corrie's paper was one of the most valuable we have had before us this afternoon. His suggestion about having lectures in the afternoon is a very good one. We have, for instance, at this Conference gentlemen capable of giving such lectures. There are Mr. Benson, Mr. Mahon, Mr. McLean, Mr. Pound, and others. Various members here are interested in different industries, and, by having a lecture from such experts, those who have a slight knowledge will have it improved by the questions that will be asked of the lecturer by the practically expert gentlemen amongst the audience. Therefore, we shall get not only the information that we would get from a similar address delivered in our own district, but this will be supplemented by the facts elicited, through the medium of questions, by the expert listener. Ticks are getting very bad in the Gympie district, and I should like to get some information from the men who have gone through the mill as to their experiences in inoculation and dipping. At present we are ignorant of whom we should go to.

Mr. J. McPherson (Rockhampton): I shall be pleased to give you all the information I can.

Mr. MAYNARD: I am quite in accord with Mr. Corrie's suggestion relative to having papers printed, for the benefit of delegates, before they are read.

Mr. J. A. HAYES (Brisbane): I think we are under a distinct obligation to Mr. Corrie for his very able paper. One remark in particular struck me very forcibly, and that was his reference to single judging. We have tried the single judge system in Brisbane, and I am pleased to say that it has met with universal sympathy from all classes of exhibitors. Certainly there may be a few who do not fall in with single judging, but otherwise it gives the greatest satisfaction amongst exhibitors.

Mr. W. R. ROBINSON (Toowoomba): Mr. Corrie's paper is certainly a good one, although to a certain extent it might be looked upon as a sort of instruction to the Chairman. It will not, I think, be taken that way, however. I agree with what Mr. Corrie says about single judging. Judges should give their reasons in points, but not publicly. Breeders and men like myself are not going into the ring to give our experience away for nothing. Government experts, like Mr. Mahon, may be perhaps in a position so to do. I believe the payment of judges is coming, and I also consider the points system is the best. All stock should be judged by points. Then there is the stewarding of shows. In a show badly stewarded it is very difficult for a judge to do his work, and at a great many shows the stewarding is disgraceful. Exhibits get into their wrong classes, and judges get the blame for giving wrong decisions. Instruction for stewards for agricultural societies is a matter worthy of attention, and a paper on the subject at our next Conference would be very useful. A show well stewarded will nearly always run smoothly.

Mr. F. W. PEEK (Loganholme): Being at the last three or four Conferences, I have learned a great deal, and what I have learned I have always been willing to impart to anyone else. It is not so much in the debates in this room, however, that our knowledge is gained. It is by the private talk we have with each other in our hotels and in the streets. It is by the imparting of views one to another that the greatest amount of good is done. I have found out that, although I had got certain impressions relative to the sugar industry, it was only by going to the Mackay Conference and going about the district, seeing the condition of the industry for myself, that I really got a clear idea of its wants and prospects. This impressed upon my mind the real value of these gatherings, and I take it that they are the greatest educational factors that have yet been introduced by the Department.

Mr. T. BURGESS (Forest Hill): This is the second Conference I have had the opportunity of attending, and I want to give you just briefly an outline of some of the advantages that I have received, because I take it that no person is interested singly. What advantages me, I take it, advantages other people. The popular opinion of people who have not attended these Conferences is that they make a jolly fine holiday. You get a free pass over the railways, and you have a week's flare up. I have not got that opinion after attending a couple. As an educational factor, I cannot find words to express what I believe these Conferences are capable of. Some of us never saw a canefield before we came to this Conference. We never saw a kanaka. I came to Bundaberg for the express purpose of inquiring into this black labour business, and I shall have something to bring back. The Federal Parliament are dealing with a matter of the greatest importance to one of Queensland's industries. I take it that a resolution from the 150 men now here assembled would not be without weight on the Parliament sitting in Melbourne. We all know perfectly well that we want to come together, that we want to meet each other, and that we want to exchange ideas to understand the difficulties under which we labour, and become interested in each other as brother farmers ought to. These Conferences bring us together. We get ideas of what we are living under—the conditions under which we work. We thought a few years ago that all you Northern fellows were slave-drivers; that there was hardly a white man among you that would not delight in getting at his "boys" with a 6-foot stockwhip; that there was a lower grade of

civilisation in the North than in the South. The Agricultural Conferences and the meeting together of the farmers are going to be amongst the best factors towards a higher grade of civilisation than we have as yet experienced. I agree with the idea of the discussions taking place immediately after a paper is read. Three papers are, perhaps, read consecutively. The first is eclipsed by the last, and is lost sight of. To adopt such a system with the present number of papers would, however, necessitate the Conference extending over a fortnight. The number of papers could be reduced, however, and then each could be discussed by itself.

Mr. L. G. Corrie (Brisbane): I would like to say a word of apology to the Chairman. The paper I read was prefaced with the remark that it was not to be considered didactic, and I would have liked it to have been the last paper read. It simply contained a number of ideas that had come to me, and I know our Chairman will not consider that they were given as a series of instructions to him. In reply to the kindly remarks that have been made I shall only reiterate one thing, and that is the desirability of fewer papers and short papers. I myself am guilty of having a rather long paper. If I had gone through it no doubt I could have made it considerably shorter, but lack of time to do so must be my plea. Short papers, few papers, and long discussions are, I think, what is required.

The Hon. D. H. Dalrymple: It seems to be almost a work of supererogation to sum up a discussion which has almost been on one side. However, I shall ask Mr. McLean to set his watch, and if I take more than five minutes to pull me up. With regard to the paper read, there is a general consensus that it is a very good one, and a very exhaustive one, and with that opinion I fully coincide. It is of value in many ways; and if Mr. Corrie has given me advice, all I can say is that in all probability it is good advice, and a man who is not fit to take advice is not fit to be a delegate, much less a chairman. I hold if a man is ever going to be in a position to give advice he can only do so by listening and taking advice. It was said by Mr. Burgess that a notion had got abroad that Conferences might be of use, but that in all probability the main object was to give the gentlemen who attended a holiday. I am not prepared to say that there would be anything wrong in taking a holiday if you remember the original significance of that word, which means a holy day. And if you spend the time here in the service of your fellow-men and spread abroad knowledge, then it is a holy day in the best possible sense. Attention has been drawn to the advisability of dealing with every question separately. To a large extent I concur with that recommendation, but Mr. Burgess has pointed out the difficulty. It is a weakness of mine that I like to have some given matter to discuss. I do not like to digress more than I can help. My mind is so constituted that I like to have a given objective point to hammer at. Therefore, I agree it is quite undesirable to have two or three subjects up for discussion at the one time. At this Conference, however, our time is limited, and we endeavoured to arrive at a compromise. Moreover, I think that substantially, in the debates, we have stuck to the same subjects. That is the main issue. If time allowed, perhaps we might also deal with every paper separately, although, as a matter of fact, you will observe that the subjects have been brought in under different heads, which practically involve the same issues, and have, therefore, been taken for what they really are. With regard to the suggestion, or opinion, that it would be a great advantage were the papers that are to be read, printed, I may say that in that opinion I again concur; but, unfortunately, it is not practicable, and we find not only that the papers are not sent in in time to be printed, but we find applications made by members to read papers even after the programme has been printed, and therefore it appears to be—doubtless from the fact you are busy men—impracticable to expect that members who have to read papers at these Conferences will be able to send them in beforehand so that they may be printed. If that course could be followed, undoubtedly it would be an advantage. I think Mr. Corrie also said

the position of chairman was not an enviable one. I concur with that, if we allow the proviso that the audience choose to make the position difficult. It is quite true that I have found it rather difficult to decide when a debate should be brought to a conclusion. The chairman exists for the convenience of the audience; the audience is not made for the convenience of the chairman. But I will say that, given a discriminating audience (such as this audience is and such as it ought to be, seeing it is a representative one), the position of the chairman can be made an enviable one. I can say distinctly that my lot, so far, has been a most enviable one, and I can only hope that all chairmen on future occasions may be placed in as happy a position.

DEPARTURE OF MR. McLEAN.

Mr. WM. DEACON (Allora): As Mr. McLean is leaving us, I think the least we can do is to pass him a vote of thanks for the work he has so far done for the promotion of the business of the Conference.

Mr. Deacon's suggestion was adopted amidst applause.

FOURTH SESSION.

WEDNESDAY, 12TH JUNE, 1901, 7·30 P.M.

INSURANCE.

The first business was the reading of the following letter from Mr. W. H. FRANKLIN, of "Ferriby," Bingera Station:—

"Ferriby," Bingera Station,
11th June, 1901.

To the Chairman and Delegates attending the Agricultural Conference at Bundaberg.

GENTLEMEN,—As, unfortunately, there is no society in my neighbourhood, the farmers have not the privilege of sending representatives to your Conference; but I venture, nevertheless, to ask you to consider a matter that seems to me to be of the greatest importance to all classes of agriculturists, and one that does not appear to have received attention commensurate with its bearing on the financial aspect of crop-growing. I refer to "Insurance." Of course you are all fully aware that few, if any, of the registered insurance companies will grant policies on growing crops, and especially is this the case with sugar-cane, on account of the risk of fire. I see no reason, however, why farmers and planters should not co-operate and establish a company exclusively for the benefit, and I may add, the profit of those engaged in agricultural pursuits. I do not think there is any business in the world so extensive in its operation and so profitable in results as that of insurance companies, and I feel certain that good results would accrue on the formation of a company established for the express purpose of insuring growing crops against loss by fire or flood, also produce in barn or stack or in transit for sale, farm buildings and implements, &c., &c. Such a scheme, I believe, would receive almost universal support. One argument I have heard advanced as a reason why it is inadvisable to insure growing crops is, that there is too much danger of fire among cane crops, and that, if they were insured, the amounts would be so heavy that large inroads would be made on the capital of any company insuring them. I would, however, point out that this difficulty might be met by placing a limit on the sum secured, as well as making the premium of a higher rate. To my mind, there is no more danger or risk in losses by crops than by maritime risks, and yet there are numbers of insurance companies established for the insurance of shipping and cargo. I therefore respectfully submit that, in view of the benefits to be derived by insurance, it is desirable that a farmers and planters' insurance company should be formed in Queensland, and I beg that you will be good enough to give the matter your consideration at the Conference now being held. As a preliminary, it may be desirable to formulate a scheme to be submitted for consideration at the next meeting of delegates, and to this end I would suggest that a committee be appointed to collect data and draw up a report. I shall be happy to assist in any way I can, and shall be glad to place my ideas in extended form at the disposal of the gentlemen appointed.

Trusting your visit to Bundaberg may be both profitable and enjoyable,

I have, &c.,

W. H. FRANKLIN.

The letter was referred to the Committee of Resolutions

Mr. T. de M. Murray-Prior, of Maroon, then read the following paper on—

LAND SETTLEMENT.

In Queensland the Government have leased to pastoral tenants some 237,690,952 acres of land, and in this paper I intend mainly to deal with the closer settlement of this enormous area, also touching on the subject of the large estates that at present are only used for pastoral purposes, while they might be utilised to better advantage were they peopled with homestead farmers.

In the past this subject of land settlement has been the weightiest problem our legislators have had to deal with, yet notwithstanding voluminous discussions, resulting in several Land Acts and many amendments, no one appears to be satisfied, and there is great dissatisfaction among the classes interested—namely, the leaseholder, grazing farmer, and agriculturist.

This being a fact impossible of contradiction, and, moreover, it being a certainty that the future prosperity of the colony depends on the production from the land, the sooner the question is re-opened by our Parliament and a new Land Act passed, based on sound and economical principles, the better for the inhabitants of Queensland.

In dealing with this most important question of land settlement, I fully recognise the fact that I have tackled a difficult subject, but hearing of no one else attempting it, and thinking that no better opportunity of discussing such an important question than at this Conference could be seized, I felt it my duty to attempt it, at the same time hoping than abler heads than mine will ventilate their opinions and throw fresh light on the subject.

The associations I represent—the Fassifern Agricultural and the Pastoralist as well as the Stockbreeders and Graziers—have a vital interest in the question, and I take it the object wished to be attained by them, as well as us all, is the settlement of a thriving and industrious population throughout the colony in areas sufficiently large to enable a family to be raised and educated from the production of said area.

Throughout the early days of settlement in Queensland and Australia the markets for agricultural produce were so limited that only a few people could gain a livelihood by land tillage. Moreover, the greater portion of inland Australia is of so arid a nature that no dependence could be placed on harvesting a crop; consequently a system of leasing was instituted, enabling the pioneers or squatters to carry on a business of grazing. These men have opened up the land, making it fit for the agricultural development that is taking place throughout the colony, for had it not been for them there would now be few inland roads or railways and little or no shipping to carry produce to markets away from home. These deeds of the pioneer squatters have given them or their successors a certain vested right that no just man in dealing with the question can deny.

Still, for all that, there is one axiom that holds good all over the world—namely, the interests of the many must preponderate or take precedence to that of the few. This principle being unquestionably sound, the ideas inculcated in this paper must be based on the principle of settling the greater number of people on the land, compatible with their own and the colony's prosperity, and at the same time interfering as little as possible with vested rights. That is the object to be aimed at, being the settlement of a thriving population on the land, who will develop its productive powers to their greatest capabilities, commensurate with the improvement of their separate holdings, at the same time taking care said land does not deteriorate in its powers of production, and that the settlement be as close as possible, provided always holdings be large enough to enable a man to rear a large family and prosper at the same time, remembering a happy and contented population is the safeguard of all States, and no population is contented and happy unless the majority are interested in the land We must also remember that with universal suffrage democracy is the power that rules the State, and till we make the majority interested in property they will never be contented. That means, to make the majority contented we must people the land with homestead farmers and graziers, as well as encourage co-operation in business and manufactures. Otherwise, a feud of classes will be maintained, and we will have no stable or good government. Nature has endowed man with many powers and attributes, but the dominant one of them all is selfishness, and while the majority are without a stake in the country that selfishness will make them envious of those who have what they desire, and foster that discontent we wish to avoid.

When I was a young man I was accustomed to large areas and few people, and did not realise the teeming population and consequent closeness of settlement in other countries; therefore, my ideas were more in sympathy with big areas, till I watched the progress of settlement caused by the homestead clauses of the 1869 Act. This was the first Act in Queensland that induced an agricultural population to settle

any distance away from the vicinity of towns. This Land Act was passed by the Mackenzie Ministry, of which my father was a member, hence the interest I took in the effect of its workings. The originators of the Act were men who understood the country, but they were not well versed in human nature, for they marred their work by allowing residence by bailiff, giving openings to the unscrupulous for evasion and fraud, and putting temptation in the way of those who were ambitious for the aggregation of large estates. Experience has proven that allowing the public promiscuously to take up land, without residence of themselves personally, causes people to select for the purpose of speculation and the locking up of land for no better purpose than grazing; that results in encouraging another class of squatter who makes no better use of the land than the original leaseholder—a manifest injustice to the vested rights of the pioneer. In fact, the encouragement of speculators of this class creates an immensity of wrongdoing, for, besides monopolising the land, it causes a laxity of morals among the people who take it up.

It is only right that squatters should give way to *bonâ fide* settlers, but not to men who make no better use of the land than they do themselves.

The spirit of the 1869 Act was good, but the administration was lax, and the Bill faulty in detail, the results being an immensity of good to the colony through the homestead clauses, and an immensity of evil through the allowance of residence by bailiff, encouraging dummying and the aggregation of large estates that now stand in the way of *bonâ fide* settlement.

This 1869 Land Act, with numerous amendments, remained in force till Dutton's Act was passed in 1884. In this Dutton made a new departure, opening up land to selectors under the title of grazing farms as leaseholders instead of freeholders. This Act had many good points as well as great faults: first and foremost, the change was too sudden in upsetting the customary course of business; secondly, a system of bailiffing was established that at once encouraged settlement other than *bonâ fide*, and now we are met face to face with a class of speculators who make use of their relations and friends to select grazing farms in the best localities, aggregating together a number of 20,000 acres that they turn to no better use than the former lessees who held the country as part of their run.

This evil of dummying large areas for speculation purposes establishes a different system of squatting, without increasing the production or population, manifestly unfair to the runholder, and injuring the advancement of the colony by locking up so much land from the legitimate settler who desires to make a home for himself and family.

The question now that appeals to our mind is how to remedy these evils. There is no other panacea but *bonâ fide* homestead settlement in sufficiently large areas, regulated after due consideration of climatic conditions and transit facilities to markets.

In the far West I would recommend areas up to 50,000 acres, and on the coast, where agriculture is profitable, from 1,280 to as low as 80 acres on good soil, areas increasing as distance from the coast increased and rainfall decreased. During the first few years of settlement rental should be as light as possible, taxation increasing as the settler prospered. Experience has proved that it takes time and money to form a home, and returns do not flow in till improvements are made and the home thoroughly established; therefore the more reason for the State to be lenient with the settler in his first years of settlement.

Talking of homestead settlement, some people might say that it is hard on the shopkeeper not to be able to take up land, and also hard on the man who has not enough money to support himself on the selection till returns come in. All I can say is that it is better for the shopkeeper not to waste money on the land till he is in a position to live on it, and for the poorer man it is better that he should work on wages till he had laid by enough to give him a good start sufficient to stock the selection and keep him till returns from the land are due, Doubtless in certain cases other systems of parting with the land are necessary, but the power of selling or leasing land to any but *bonâ fide* homestead settlers should be seldom exercised, for it seems like parting with the people's moral rights in their patrimony without a proper equivalent—that is, in other words, wasting the capital of the State. The promiscuous sale of land, too, generates the evil of extravagance and greed among our legislators and their hangers-on.

The principles enunciated in Dutton's Act were good, and the system of leasing a good commercial way of settlement for the State, but the administration of the Act has been bad; consequently Dutton's dreams have been far from realised. One great evil that need never have taken place has been delay in confirming applications. It is not right that after a man has paid his money, and his application been accepted, that any delay of lengthened character should occur before he took possession, and in

future Acts this evil should be guarded against. Another great evil has been opening up land in unsuitable areas. I have known for a fact a man searching for months before he could obtain a grazing farm that gave him any prospect of prosperous settlement. This has been occasioned by the want of practical knowledge of settlement by our Ministers for Land and their subordinates.

This evil could be easily remedied by employing men to survey the land with practical knowledge, and giving them power to use their own judgment, of course under an efficient board such as a practical land board. Mr. Dutton instituted a map and information office, which if properly carried out would be of immense benefit to settlers.

Another evil that has disgusted many selectors has been the numerous amendments to Land Acts, without due regard to the interests of those who have already selected; generally every amendment has reduced prices, and the first buyer or settler has had to submit to reduced values without compensation.

In illustration I will quote the case of a selector I know near the borders of New South Wales, who took up land valued at that time at the purchasing price of 15s. an acre. After living on the said land for five years, proving it was well adapted to fruit-growing, especially of the citrus tribe, the adjoining land held by the Government was opened up to homestead selectors at 2s. 6d. an acre, and to others at 10s. per acre. This injustice seemed to this man so great that he gave over his farm to his brother, who had lent him a little money, and went over the border to New South Wales to settle.

Numerous have been the instances of land being sold by the Government at £1 an acre, and later on similar land in the same neighbourhood they have sold at 10s—a manifest injustice to the original purchaser, lowering the value of his land.

Now, having shown you the evils embodied in the present and former Land Acts, as well as the principles that experience has proved to me should guide future legislation, the next subject that naturally arises is the formulation of suggestions to be embodied in a new Land Act.

Taking first the agricultural districts, I think the maximum area should be 1,280 acres; residence a *sine qua non*. Supposing, however, a farmer's homestead comprised only a small area, he should be allowed to take up rougher land elsewhere, not exceeding in the aggregate 1,280 acres, and, say, not distant over 15 miles from his farm. This would give him a paddock where he could keep his young stock and those that required spelling, but no one who possessed over 1,280 acres, whether freehold or not, should be allowed to select.

In other than districts where agriculture could be carried on profitably, homestead grazing farms should be opened in sizes regulated by the carrying capacity of the land, and distance from ports or markets, remembering that where carriage was high, a man required a greater number of stock to return him a fair living.

In the semi-coastal districts I think the area of grazing homestead farms should be from 5 to 20,000 acres, and in the Western interior from 10 to 50,000 acres. Some people will, I know, say these areas are too large, but they must remember that life in the far West is a very hard one, and seasons very irregular; therefore, the settler should have the prospect of a larger reward for his labour than those on the coast. In this paper it is manifestly impossible to enter into detail as to areas in such a large State as Queensland, with so much diversity of soil and climate, but in the foregoing I think I have clearly shown what practical experience has taught me—the method of attaining the desired end, a prosperous homestead settlement.

Prices and income are the next object to be considered. As I have previously written, it would be a mistake to cripple the settler at the commencement of his career by obliging him to pay heavy rents, for to do so would be like killing the goose who lays the golden egg; therefore I think the present prices of homestead agricultural farms quite sufficient, and I think that grazing farms for the first three years of settlement to *bonâ fide* settlers should not be over 1d. per acre per annum for the best land, less for worse according to quality, and after three years rental should be gradually increased, provided seasons and values were favourable to the depasturing of stock. In considering this subject of land revenue we must not forget that every additional family producing the fruits of the land by labour and settlement, contribute in many incidental ways to the revenue of the State; that being the case, it is certainly sound policy to hold out every inducement for families to settle and make a home on the land, so that by their labour they may increase production, and in that, as well as other ways, add to the wealth of the State.

The squatter cannot complain when land is only taken out of his leaseholds or occupation license, as it is required for better purposes, and if he considers the question from a business point of view it does him no harm, for each new settler requires stock and gives him purchasers at increased value, fully compensating him for the loss of the country.

In all fairness also he, as the original occupier or pioneer, or his representative, should be granted fair sized areas round his homestead that he could look upon as his own to sell or retain as he desired.

This principle was recognised in the 1869 Act, for it contained a clause allowing the station-owner to take up 2,500 acres at a moderate price, provided his improvements amounted to the value of £1,250. This was only justice, and as an axiom, liberality with justice should be the motto of all Governments.

Hoping I have not wearied you, I must now touch shortly on two more very important questions connected with land settlement—that is, roads and reserves Numbers of divisional boards in agricultural districts have had experience of the difficulty of giving access to backblocks, also of the great and unnecessary length of roads caused by angles unrequired and unnecessary.

It is generally believed that often the surveyor of a road has made these unnecessary angles for his own profit through a system of the Government giving additional pay for every turn. Again, in surveying a farm, it is impossible for a surveyor to tell for certain the future need for roads or the routes they should take, so I should recommend that in every farm sufficient land should be included over and above the area the selector pays for, so that when required a road could be surveyed through his land.

As regards reserves, I would recommend that, at certain distances apart, about 8 miles or a day's stage for travelling stock, certain areas should be reserved and placed under the control of the divisional boards, who should be obliged to have them fenced and kept free of stray stock, for which trouble or expense the boards might be allowed to compensate themselves by charging the drovers of each mob of stock or teams a moderate fee; then travelling stock would be insured good camps.

In Queensland there has never been any proper system of reserves or of controlling those that have been proclaimed, so a general practice has become the custom —namely, for grass pirates to overrun these reserves with stock. Consequently legitimate travellers seldom find any grass on them for their hungry, weary animals.

Before closing, I should like to say a few words regarding the repurchase of estates for the promotion of settlement, and suggest that the divisional boards should be the bodies requested to recommend repurchases, and to be trusted with the negotiation of the business, subject always to valuation by the Government inspector and approval by the Government. Divisional boards in farming districts are generally acquainted with the capabilities of land in their neighbourhood—its commercial value, and the desire of the community to repurchase and settle on the said land. Again, it is to their interest that settlement be promoted, and for that reason they are the more likely to be unbiassed agents. This system also, if instituted, would take the onus of favouritism out of the hands of the Government, and deprive the Opposition of a handle by which they very often cause abuse to be heaped on innocent heads.

In discussing what I have written, I should like to get the opinion of this Conference as to the principles I have enunciated in this paper, namely:—Homestead settlement being adopted as the only safe way of preventing fraud and monopoly; also the justest mode of settlement to the present occupier and the people generally settled throughout Queensland. Secondly: Reserves being proclaimed in main roads at suitable distances, and given into the control of divisional boards, who are bound to have them fenced and kept free of stray stock. Thirdly: That the repurchase of estates for the purpose of settlement only be made after the recommendation of divisional boards, subject, of course, to the approval of the Land Board and Government of the day.

DISCUSSION.

Mr. E. ROBERT (Cairns): I am against allowing the selection of 1,280-acre blocks for agricultural purposes. This was the cause of much of our Northern land being monopolised by speculators and capitalists, and it was through them that our Russell Mill was thrown out. At the present moment there are two Chinamen on the Mulgrave River renting 1,500 acres from syndicates. Most of land in the North pays no rent, as we can see from the register. It is merely being kept from the *bonâ fide* settler, and all through the fault of the Land Acts allowing such big areas to be taken up. Twenty years ago, when the Cairns district was first opened, Freshwater Creek was all under cultivation. It is now a waste and lying idle, the Chinamen having thrown it all up. It will be the same with the rest of our land if this system of monopoly is not stopped. We want another clause in the Land Act to prevent selectors, whether conditional or unconditional, leasing or letting their lands to aliens. If

they do so, they should be made to forfeit their titles. That is the only thing that will stop the monopolising of land. If such a provision is introduced speculators will not take the land up, because, with the Chinamen barred, they will get no one to give them any rent for it.

Mr. J. Scanlan (Helidon): In our district there is a creek which in times of wet weather is well supplied with water, but in anything like a drought it gets pretty dry. There are places in it, however, where springs are continuously running; and the point I which to emphasise is, that our roads and water reserves should be so marked off that it would be impossible for such springs to be monopolised by private individuals, or for divisional boards or Ministers for Lands to dispose of them. In our district, interested parties have managed to have a very desirable reserve closed and finally alienated. The result is that twenty or thirty selectors cannot get near to where the permanent water exists; and I fancy if Mr. Murray-Prior had added something of this nature to his otherwise very able paper, I think it would have improved it.

Mr. T. E. Coulson (Rosewood): It seems that we all like to be eloquent about our own districts, and I may first of all say that I come from a district that is second to none in Queensland. The land is second to none, and there is also a very big variety of it. There is not the slightest doubt that Nature in nearly every country has provided for the people of that country, and, so far as this great State of ours is concerned, we have land admirably adapted for settling teeming millions of population and feeding them. We have no land, unfortunately, to let to Chinamen in Rosewood. There was once plenty of available land there, but men of capital would not touch it because it would have cost so much to clear it. There were men to take it up, however, and these were men whose only capital was their axes, a bag of flour, and a gun to shoot a wallaby to make a bit of soup with. Many of these men have now nice little banking accounts. We have a big country; and if all had done as I did, we would now have a big population. Nature has provided in this country for a teeming population to live upon the land, and what should be impressed upon the Government is, the necessity for setting apart good land for agricultural settlement—land fit for a man to make a living from. Every one of my boys tells me, if ever they take up a bit of land, that it must be good.

Mr. A. Moffat (Radford): This morning you saw a delegate on this platform giving you a great big rigmarole of a paper on cheap money. The same delegate is now before you advocating cheap land. I am very pleased with my colleague's paper on land settlement. After all we have a great estate, called the Crown lands of Queensland, that do not belong to King Edward VII., the Duke of York, nor yet to the Minister for Agriculture. They belong to you and me. Why should we not have them? We have got a lot of men who have nice little properties, and who put a sort of fictitious price upon them. Supposing your property comes to be worth a fine big sum, what the better are you? If you sell your property for, say, £3,000, you have only got to go away and buy another so that you are as you were. I have got a bit of property, which Mr. Mahon tells me is worth £10 an acre. There are 700 acres of it, so, if sold, that would mean about £7,000. But that would not benefit me. I would only have to buy another, or else leave the country and go home to Scotland. I am afraid the latter is what I would do. It is absurd trying to boom our properties.

Mr. L. Moody (Geraldton): I shall confine my remarks on the question under discussion to that part dealing with divisional boards. Mr. Murray-Prior recommends the placing of reserves about every 8 miles along the main stock routes, these reserves to be handed over to the divisional boards to fence and keep clear of stray stock, a small fee being charged for the grazing of travelling stock. I think there would be difficulty experienced in getting the boards to fence such reserves. In a great many districts their means are very limited, and it would be a serious item to have to fence in reserves every 8 miles through some of the large Western districts. I will admit that this is a question that Mr. Murray-Prior probably understands better than any other

man in this room; but he is a pastoralist, and likes to have his travelling stock well fed when brought down to market. But I do not think it is fair to charge this to the boards, and the suggested fees would hardly be sufficient to cover the expense. With reference to the handing over of the recommendation that estates should be repurchased by the Government, I think that it would be productive of more log-rolling than there is at present. I think to do so would be both impracticable and unwise.

Mr. R. C. LETHBRIDGE (Maranoa): We must all congratulate Mr. Murray-Prior on his very able paper, and I am very glad he had the pluck to tackle such a big subject. I think it will be regretted all round that Mr. Prior was not one of those sent down to the Federal Senate, the more especially as he was the only *boná fide* producer that stood for election. I know that a great many Western people earnestly hoped that he would be sent down to represent them. With regard to the land laws of the State, I speak from a leaseholder's or squatter's point of view. There is a great deal of dissatisfaction at present both among the squatters and the grazing farmers and selectors concerning the rents. We never know what may be the upshot of the next decision of the Land Court. Besides, the present mode of adjusting the rates is unequal and unjust. I pay 50 per cent. more rent than my neighbour on the other side of the wire fence, though the country is similar, and he is 50 miles nearer the railway than I am. When the 1884 Act was passed squatters were precluded from selecting any land within 25 miles of their own runs. As for the matter of areas, there is no doubt that on land on the coast people can make a living on a less area than they can out back. People who live near the coast have not the slightest conception of the state of the country out West, where I have known areas of from 20 to 50 miles to be totally useless for the past two or three years. I would certainly advocate large areas for the Western districts.

Mr. L. G. CORRIE (Brisbane): I must add mine to the congratulations that have already been paid to Mr. Murray-Prior for his fine paper. It is gratifying to find a man in Mr. Murray-Prior's position coming here and reading such a paper, pointing out how things can be done to encourage closer settlement upon the land. I wish, however, to refer to one point that was not touched upon in his paper, and I take it that anything to secure land settlement will be in order. Mr. Scanlan touched very closely upon what I have to say, and that is about areas of land having permanent water getting into one man's hands. Although it is very desirable to make land cheap, I think some scheme might be thought out whereby we could contend against the disadvantages of irregular rainfall. There has been a great deal done in the way of bores, but I feel satisfied that, until this great subject of water conservation is properly tackled, there will not be much chance for closer land settlement. No doubt our land laws might be improved, but I should like to see the Government take up this matter of water in a business-like way. It is a matter that will have to be tackled. If you look straight across to America you will find that in California the great saying is that "Water is king," and it is no less king in Queensland. Why people do better on the coast is because the rainfall is more certain. I know that in the West much is done in the direction of dams, but I do not think as much attention is given to the subject as should be. I know that in the Kalihari desert, in South Africa, when they started settlement there, each man took a piece of ground and made a reservoir on his own property by scooping one out with a plough. It was found there, too, that, as settlement increased, the rainfall increased. The breaking up of the soil has gradually altered the meteorological conditions of the country. I would certainly like the Government to try and do something in this direction, for we cannot shut our eyes to the fact that the rainfall of Queensland is not satisfactory. As to the question of improvements, we know that there have been thousands of miles of fencing put round selections in Queensland which have never been of much use to anyone, but which have been simply erected to comply with certain conditions of the land laws.

Mr. W. Miscamble (Roma): I congratulate Mr. Murray-Prior upon his paper, and think that 1,280 acres is not a bit too much for a man in some parts of the country. I am not going to deal with the subject from the pastoral point of view, but I certainly think that to men who live near to the Brisbane markets, and who live on the coastal side of the Range, 100 acres are worth more than 1,280 acres out in my part of the world. While the Government is to be congratulated on many of the things they have done for the farmers, there is much that still might be done to improve the condition of farmers in the West. For instance, a lot of farmers were put down on 80-acre blocks at Wallumbilla to starve. Some of them have bought out their neighbours and now have 160 acres, but that is little enough. I think every man who has taken up 160 acres as a homestead selection should have the right of taking up any quantity of more land up to 1,280 acres as homestead. It would enable him to get a living out there. This country has gone to great expense in introducing German settlers, better than whom it would be impossible to introduce, but I think we may get better ones in the State, and I think a child born in this country should have 300 acres as a natural birthright. He should be allowed to take it up in any portion of the State open to selection, although I do not say that one family should be allowed to take it up *in globo*, as a numerous one might get too much in one district.

Mr. T. de M. Murray-Prior (Maroon): I must thank the speakers for their kind remarks on my paper, but would have liked that more had been said on the subject of homestead selection. The first gentleman who criticised what I proposed, spoke of land being leased to Chinese and against areas of 1,280 acres, but I think he mistook the tenor of my paper. I believe in his idea, however, of not allowing land to be sublet to aliens. Mr. Moody spoke against my proposal of fencing in reserves, and seemed to attribute motives for my own good. But I can tell Mr. Moody that I had no idea of the sort, and I am sure that if reserves were fenced in by divisional boards the expense would be very much less than Mr. Moody thinks. Take 640 acres. That could be fenced in for £100, and the interest on that amount could easily be obtained from the fees paid by travelling stock. In our coastal districts we have great difficulty in getting land for bullock teams. I know we get large rentals from teamsters by allowing them to camp on our land. If boards, such as ours in the Fassifern district, had the reserves they would be a source of revenue instead of being, as they often are, harbours for noxious weeds and other pests. Mr. Miscamble gave words to my idea. In his district the areas should be much bigger for homestead settlers than they are on the coast. The nearer you get to the coast, the better the land and the better the rainfall. The areas, therefore, should be less there than further West.

The Hon. D. H. Dalrymple: I can gather from the approval that has fallen from the meeting that it, at any rate, is of opinion that the land should not be leased to coloured aliens, and that it is also in favour of handing over the land to children born in the State. Mr. Murray-Prior has treated of a very big subject, and I am sorry that lack of time precludes me from saying a few words on it. That I should wish to do so is natural. It is a current belief, as a matter of fact, in the House, that every member of Parliament, and every candidate for Parliament, always walks the street with a new Land Bill in his pocket. The next paper is by Mr. Percy Biddles, of Tiaro, and is entitled—

MANURES AND THEIR VALUE IN AGRICULTURE.

There are many here who perhaps know more and have greater experience on this subject than myself; but the idea seems to prevail amongst the large majority of farmers and agriculturists of this State, that the land should stand cropping from year to year, and so on, for an unlimited period, without any assistance in the way of manures. But it only needs a little intelligent experiment to disprove this idea.

If we take into consideration that the entire substance, both flesh and bone of man and animals, is derived from the same materials, structural portions of the plants we grow and cultivate, we find that both alike come directly and indirectly from the same sources —the soil and the atmosphere—all are, practically speaking, grown from the dust.

All plants derive the several materials from which they are built up *directly* from the several minerals of the earth and from the gases of the atmosphere, and all animal creation *indirectly* through the vegetable creation.

Chemistry has clearly demonstrated that the lime, potash, and phosphates of the soil, and the nitrogen of the air, by a wonderful dispensation of Providence, become good for the life of plants, and ultimately build up the structures and bodies of animal life.

Nor are these materials, which nature has provided in the earth, squandered. A wonderful economy has been displayed in every part of creation. The several matters which are taken in as food and make blood, flesh, and solid bone, are not allowed even then to remain inactive. They have no sooner performed the office assigned to them, than they are discharged from the body; and in the liquid and solid excrement of both man and animals, if properly utilised, there exist material aids for reproducing seeds and plants.

It has been proved by chemical analyses that the various crops require the constituents of the soil in different proportions for their proper growth, which will account for the advantage derived from a rotation of crops, and will also partly explain why some experiments have failed when made indiscriminately with either lime, bones, guano, or salt. They have each been expected by some unthinking advocates to produce great results on every variety of soil for every description of crop. Land already charged heavily with saline matter will derive no benefit from a dressing of salt. Neither will land well supplied with lime or its compounds be improved by a lime dressing. But with a moderate amount of experiment and knowledge it will be found there is no land which may not be improved in some manner, and the means of improvement are at the command of every cultivator, be he small or great.

The laws of nature and science teach us that every plant requires light, heat, air, water, and a fertile soil in order to grow to the best advantage. The laws governing the amount of sunshine are beyond the control of the farmer. Recognising this fact it should be his chief object to prepare his soil in the very best way, to select that best adapted to the crop to be grown, and to manure correctly, so that his fields will become more fertile, and consequently, upon a given area, yield a larger and more profitable crop.

Potash, phosphoric acid, and lime are taken from the soil in large quantities, and nitrogen from soil and air, and after continuous cropping even the very best of soils will fail in these substances.

The products of the farm, such as grain, roots, hay, milk, &c., contain large quantities of potash, phosphorus, and nitrogen. The large amount continually taken out with no return soon decreases the fertility of the land, and it is only natural that by such a system the farmer finds his farm decreasing in productive capacity, and blames first one thing and then another, but never himself.

The farmer has three or four different means of manuring his land, but he must find out what his land requires or he may manure without avail, and to assist him to this knowledge there might be established an agricultural analytical department on a cheap scale. I shall, however, speak of this a little later on.

Farmyard manure is one of the easiest procurable in most cases on a farm, and consists properly of the liquid and solid excrement of domestic animals—horses, cows, pigs, sheep, or fowls—as well as litter, old grass, and refuse of all sorts. These contain all the nutrients required for plants; but, according to the scientists, these nutritious elements are not in the right proportions, and are sparingly present compared with the bulk of the material. This manure is very important, however, on account of the beneficial influence it exerts on the physical condition of the soil, as, by its judicious use, a heavy cold soil is rendered lighter and warmer, while a light, dry soil is rendered more cohesive and moist, and with the addition of a potash manure it is very valuable.

Another system of improving and manuring land is to plough in green crops, such as cow pea, velvet bean, snake bean, green corn, &c. The ploughing under of these leguminous crops is of very great advantage from the fact that they gather from the atmosphere a great amount of nitrogen and a certain amount of phosphoric acid and potash from the lower strata of soil, and also leave the land in a much lighter and more friable condition, thus saving more expensive manure and labour.

Generally, the fertilising ingredients found in farmyard manure and in green manuring do not exist in those proportions required by many crops, and should, therefore, be supplied by the addition of artificial fertilisers. In these last we have the power of supplementing our farmyard and green manures by whatever is required for the crop to be grown.

It is not generally known that farmyard and green manures are not always of much value to any extent—that is, as fertilisers for leguminous plants, as they are deficient in phosporus and potash. Nitrogen is their strong point, and it is nearly all available in the first year, and they are very valuable for Indian corn, potatoes, beets, mangolds, and all the Brassica tribe, as these plants respond quickly to the increased supply of nitrogen. Then we have the chemical manures, of which there are many. With these, intelligently applied, we have the power to make our lands perfect for growing any crops, as with them we can supply the correct amount of potash or phosporic acid and lime, but they require to be intelligently applied, for, as I said before, it is of no use to put the wrong manures on the wrong ground.

For the benefit of those who do not know how the different plant foods act, I may state briefly that nitrogen acts to a certain extent as a stimulant to plant life. It promotes the leaf and wood growth. Large dark-green leaves, which we all like to see, and consequently vigorous assimilation and large, well-formed plants, ears, or fruit, are the result of nitrogen manuring.

Phosphoric acid conduces to the formation of grain, blossoms, and fruit.

Potash is the most important ingredient necessary for the promotion of strong growth as well as of heavy yield.

Lime, in conjunction with potash, strengthens the fibre of all plants.

What does my land require? Many a struggling farmer would like to know this. He wants to manure, and does so with the first material he can lay his hands on. Perhaps he uses the very thing the land does not require. He goes on slaving at a large area and getting but small return for his labour, whereas with a little information and knowledge he would get double the crop from half the area.

This brings me to what I wish to lead up to. The Agricultural Department tries to do, and doubtless does do, a great amount of good for agriculture in this State. And agriculture does a great deal for the State also. The Department employs an analytical chemist and runs a laboratory, I believe. Why should the Department not take the lead and so arrange the laboratory staff that a *bonâ fide* agriculturist can get his soil analysed for a low figure. Then, knowing what his soil is deficient in, he will know what it requires, and can act accordingly. I believe that, in Germany, analyses are made for such a low fee as to be practically free. I am aware that soils are now analysed by the Department, but I think the fee demanded is prohibitive to poor struggling farmers.

My paper has not been an exhaustive one, but it is enough for discussion, and I hope will cause some of my fellow-farmers to pause, think, and act, and so will find it profitable for them in every way by ensuring for them better crops, less work, and more money.

DISCUSSION.

Mr. Thos. Binnie (Cairns): Mr. Biddles' paper appeals to all of us, and especially to us cane men. A matter that I am anxious to bring forward is the export of meatworks manure, and I would like to see a petition to the Federal Government asking for the imposition of an export tax on such manure. Meatworks manure contains most of the constituents our soils require, and something should be done to prevent it going out of the country as it does.

Mr. W. Jacklin (Zillmere): Manuring is a very important question, and it seems a sin to see the way thousands of tons of nightsoil are thrown away annually in Brisbane. Something should be done to put this fine manure into a portable form for the use of farmers instead of allowing it to be thrown into the sea as it is now. If it could be dried (not burned, for that would destroy the nitrogen in it) we would be able to handle it, and this would be far preferable to the present wasteful system of disposing of such a valuable fertiliser. The urine could be drawn off into closed-in tanks.

Mr. Ridley (North Pine): I have had a good deal of experience with the manure mentioned by Mr. Jacklin, and may say that the municipality of South Brisbane burn their nightsoil and supply it to farmers. Zillmere takes hundreds of tons of this prepared nightsoil manure, and if this Conference could induce the municipality of North Brisbane to do the same as South Brisbane is doing we would get that manure a great deal cheaper. The advantage of sanitary manure over meatworks manure, on heavy land especially is something wonderful. I tried bonedust on pineapples, and found that the pines were getting worse every year. The last few years I made an application of about 20 tons of sanitary manure to the acre with the very best results. I find, moreover, that I can get 12 tons of that manure for the same

price as I would get 1 ton of Eagle Farm manure. I believe that everything that comes out of the land should be returned to it, and am sorry the municipality of North Brisbane can find no better scheme for the disposal of their nightsoil than to take it out to sea to poison the fishes with. I hope Mr. Corrie will be able to use his influence for the introduction of a more economic system, for I know he is in favour of letting the farmers have the nightsoil. There is nothing objectionable in the South Brisbane system, and it results in the preparation of what I believe is a complete fertiliser, and one that has in it all the ingredients that we want.

Mr. J. W. LEE (Zillmere): I am very pleased that the subject of manuring has been set down as a topic for discussion, as I am sure that for the farmer there is no more important one. The gentleman who read the paper apparently went to a good deal of trouble over it, and has provided us with a good deal of food for reflection. The analysing of soils has been mentioned; but when you have obtained an analysis of a soil, what are you to do with it? No analyst that I know of can give you a just idea of what your soil requires at the time. The question is not what your soil is composed of, but whether that which is in the soil is available for plant food. If the constituents are not available, then the analysis is not worth the paper it is written on. The analysis may show potash, but it may be in that condition that it is of no use to the plants that you may have to grow on the land. Suppose a man is pulled up for starving his children. He pleads that there is plenty of food in his house; but when the policeman inspects that house, he finds that, although there is plenty of food there, it is all locked up. It is precisely the same with the soil. The food may be in the soil, but unless it is available for plant food, and unless the analyst can give you an idea as to whether it is available (and they have not been able to do so yet, so far as I am aware), then a soil analysis is not much good. I have used a good many of these artificial manures that are placed upon the market, but at the same time I maintain that it is not very becoming that a State like Queensland should allow the refuse from the bodies of 100,000 people to be thrown into the Bay to no purpose whatever. All these 100,000 people are fed from the land, and what comes from them I maintain should go back to the land. We are like men drawing upon our bank overdrafts. We are constantly cropping our soil, and returning nothing like what we should do to it. I know this sanitary manure in its present condition is very difficult to handle, but I was one of a deputation that went the other day to Dr. Ham, the Health Commissioner, on the subject, and he was quite of our opinion that the nightsoil should be utilised for fertilising purposes. I remember we approached the Corporation about twenty years ago on this very same matter, and were told we could have the excreta if we took it away from the closets. The Government might well assist us in the direction of plants being established for the treating of the nightsoil with the object of making it portable.

Mr. W. R. ROBINSON (Toowoomba): With regard to the remarks made by me on a previous occasion relative to shows, I wish to explain that my contention is that, if a gentleman is asked to judge at shows and the single judge system is adopted, the time has arrived when we shall have to pay for our judges. You judge at one show, and then are asked to oblige about twenty other show committees in a similar manner. It becomes a tax on a man, and I say the time has come when practical men should be paid for their opinions at shows. As for the subject of manures, I may say it is one that I am not acquainted with. Thanks to the soil they are blessed with, it is a question that has not yet troubled the Darling Downs farmers. I know this much about it, however. The value of farmyard manure depends upon the kind of food you feed your stock upon. You need not expect to get good farmyard manure if you feed your cows upon prickly pear.

Mr. J. E. DEAN (Maryborough): Mr. Robinson states he knows nothing about manures, but concludes with an important truth. Some time back I began to use Sunlight oil cake, which is really the by-product of the cocoanut.

I find wherever I have applied the manure from the animals eating that cake I have better crops than from places where manure from animals that fed on the natural grasses was applied, although these grasses were of good quality. Looking at the crops side by side, you can easily see the difference of effect in the two manures. With regard to the export of bonedust and meatworks refuse, I may say that some time ago I tried to get bonedust from one of the meatworks, and had to wait three months for it. Another place told me that they had orders booked for the next three years. In this case it was going to Japan. We are allowing our own birthright to pass away, and I think it would be very wise to advise the Government to put an export duty on these things. There are a number of fertilisers that come into the State, but I think that many of them are of very little value. As an outcome of a discussion at a meeting of our farmers' association, we recommended the Department of Agriculture to take steps for the analysing of all fertilisers that came into the State, and if this was done it would be a source of protection to the farmer. I find that in the use of nitrate of soda we can get an increase in a crop, but if you fail to back that up with other manures you will impoverish your land ultimately. It is like using lime by itself. Manures of various kinds and intelligently applied are amongst the very best investments a farmer can make. At The Island, Maryborough, we are conducting a series of manurial experiments, and I think every association in the State could do the same with profit to all concerned.

Mr. E. SWAYNE (Mackay): This question of manures is one of the greatest interest to the district I come from, and we have found there that the purchase of fertilisers affords great scope for co-operative enterprise among farmers. With regard to commercial manures, we want an Act on lines similar to the one in force in South Australia. In South Australia vendors are required to give a guarantee with delivery. If the fertiliser does not come up to this guarantee, a penalty is incurred. As Mr. Brünnich, of the Agricultural Department, is in the hall, I think we could not do better than ask him for some information on the subject.

Mr. G. SEARLE (Toowoomba): Manuring is a subject all farmers must, at some time or another, face. Although I come from a district where the soil is considered fit to cultivate for twenty years without manuring, there are those who recognise, and benefit by so doing, the value of manures even on the very heavy strong lands of the Downs. One gentleman said an analysis of a soil gave little information to the farmer, but I can hardly agree with him. Although an analysis does not convey the information sometimes that he would like, it is simply because he is not acquainted with the constituents which each particular crop takes out of the ground. It is well known that volcanic soils are more benefited by the application of farmyard manure than are heavier soils without drainage. Heavy soils require a great amount of humus. They have the plant food locked up, and it needs the application of lime to bring those constituents into a solvent condition. Green manuring is very beneficial to light soils. There are farmyard manures and farmyard manures. In the opinion of many people, farmyard manure is an accumulation of manure. This is allowed to gradually get rotten, and eventually it is applied to the soil. This, as a rule, is not a manure at all, but simply a vegetable humus. It does not contain the constituents of real farmyard manure. If you want good farmyard manure, you must look after it, allow it to ferment and gradually develop. If you turn over a well-prepared farmyard manure heap, you will find there is a large amount of ammonia escaping, and the way to fix that ammonia is to sprinkle it with salt water. You will find one ton of properly manipulated farmyard manure equal in value to five or six tons of stuff that has been left to look after itself.

Mr. J. C. BRÜNNICH (Chemist to the Department of Agriculture): The question of manuring is undoubtedly a very important one, and I hardly know how to do it justice in the short time allotted. There seems to be a great deal of uncertainty as to the value of soil analysis amongst our delegates. I may

state that Mr. Lee is almost right in his expression of opinion, that we really know at present very little with regard to the available plant foods in a soil from its simple agricultural analysis. To give an instance how difficult it often is to judge the requirements of a soil from the ordinary short analysis, I may state that Mr. Guthrie, the Agricultural Chemist of New South Wales, carried out a series of very extensive experiments with wheats at the Bathurst and Wagga experiment farms, the results of which were published in the last number (April) of the New South Wales *Agricultural Gazette*. The short analysis of the soils was given for comparison. Strange to say, the results showed that the soil richest in nitrogen was most benefited by the application of nitrogenous manures. The one soil contained ·24 per cent. nitrogen, the other only ·06 per cent. The latter soil seemed to contain sufficient nitrogen to do justice to the growing crop, whereas with the other soil nitrogenous manures had to be applied to get good results. Every farmer has, however, the power of finding out what his soil requires to a great extent in his own hands by simply carrying out a few manuring experiments. Such experiments need not entail much expenditure, as they are carried out on very small blocks, but still the information gained would be invaluable. In some manuring experiments carried out in Switzerland, unmanured blocks gave a crop of 13 bushels of wheat per acre. Six different experiments were carried out on the land. The crops of the incompletely manured blocks varied from 15 to 20 bushels per acre. A block with a complete manure yielded 27 bushels; an addition of lime to the same complete manure increased the yield by another 5 bushels per acre. It will thus be seen that by the addition of some extra lime the value of the manuring was considerably increased. With regard to stable manure and the remarks which have been made, that its value is influenced by the food of the stock, I may say that this point has to be considered, but the last speaker's remarks are of still greater importance. Stable manure must be collected in properly constructed compost heaps. In a climate like ours a great loss of nitrogen would follow if the manure is simply collected in small heaps here and there. The compost heap must always be kept thoroughly moist, and layers of straw alternate with layers of manure in order that the nitrogen may be absorbed. With regard to a Fertiliser Act, I must state that the late Mr. Chataway had the matter under consideration. There is no doubt that it is of the greatest importance that a farmer should be able to depend upon the quality of the manure he is buying. The analysing of every shipload of manures would be inpracticable, and would be of no value with regard to a special lot of manure a farmer should happen to buy. Manures should only be bought under guarantee with regard to composition from the supplier. Nightsoil is certainly of great value, and should not be wasted; but if burnt, a lot of its ingredients would be lost. I have not yet seen a sample of the prepared nightsoil from the South Brisbane Company, and do not know how it is made. However, if it is simply desiccated it would be of far more value than if burnt.

Mr. P. BIDDLES (Tiaro): I am glad my paper has caused a discussion, as it was chiefly with that object in view that it was read. I may mention an instance of the value of manuring. A person I know of took up a piece of scrub land at a cost of £15 an acre. Another man came alongside of him and bought some forest land at 30s. an acre. The latter manured his land to the extent of £4 10s. per acre, making its total cost £6 per acre. He now gets better crops than the owner of the scrub land, and, if he keeps on manuring, will continue to do so.

The Hon. D. H. DALRYMPLE: It has been complained that the Agricultural Department charges a somewhat high price for analyses. I wish to point out that the fee charged to farmers, whatever may be the price, is only half the cost. The taxpayers of the State pay the other half. It has been suggested that a law be passed to prevent meatworks manures from being sent out of the State. After all, they have been prepared by companies who have debts to pay to the Government, and one might suppose they were entitled to whatever they could get for these preparations. The manure is their property, and I think, if

the farmers want it, it is not unreasonable to ask them to pay what these people are able to get. It seems painful to see products which would be so useful here going to New Zealand. But that is not the fault of the people who sell the manure. It seems a want of enterprise on the part of ourselves. If it is worth while to take manures from Queensland to New Zealand it seems to me that it would be desirable were our farmers to purchase substances which are so valuable. With reference to the disposal of nightsoil, it must be remembered that if we ask municipalities to go to a large expense in converting it into a portable fertiliser, some one or other will be called upon to pay that extra expense. These are little practical difficulties that have always to be taken into consideration.

Mr. T. Burgess, of Forest Hill, then read an essay on—

THE INFLUENCE OF CLIMATE ON QUEENSLAND AGRICULTURE.

The influence of climate on agriculture in Queensland is perhaps greater than it is in slower, colder, or less tropical climates, and all of us who are engaged in the somewhat precarious industry of agriculture in Queensland, know how largely our interests are affected for better or worse by the ever-varying climatic conditions under which we live. In this short paper I intend to deal with two or three aspects of agricultural life which I consider are largely influenced by the climate under which we live, which, perhaps, in the minds of many have never been attributed to climatic influences. The first aspect at which I will glance is to me a most important one—namely, the influence of climate on the moral character of agriculture. There may be some here who will at once say, What on earth has climate to do with moral character, and what in the name of common sense has moral character to do with agriculture? I answer, A very great deal, far more, perhaps, than what appears at first glance. No one will deny but that the Queensland climate is capable of producing and developing a splendid physique in persons; and the class of men springing from agricultural environments and the atmosphere of Queensland will rank among the first of the world. They are capable of taking up the battle of human life and conquering in the fight with the first of the sons of men. Our agricultural industry, with its healthy surroundings, its green fields, its bracing atmosphere, its morning dews, its fresh air, its ripening grains, its beautiful harvests—all these influences being operated upon by our Queensland climate with its beautiful sunrises and glorious sunsets, when the king of the heavens, setting like a ball of burnished gold, touches the clouds into mantles of glory and throws his shafts of light away into mid-heavens—is capable of calling up all that is best in the life of our Queensland youths and fitting them to take a first place among the nations of the world. Our agricultural industry produces men more akin to nature than does any other calling; and the more young life is fed on the home-made bread of natural and healthful surroundings the less they have to do with city snobbery and the confectionery stuff many of our town lads grow on—the more resourceful and self-reliant do they become; and when once our young Queenslanders begin to think for themselves, and depend on themselves, their success in life is assured and their future is safe, because in them, thanks to our liberal laws, our large sense of freedom, our splendid bracing climate, our absence to a large extent from formality and ceremony, we learn early in life to place both feet on the ground, to swing both arms when we walk, to breathe with both lungs, to drink in the moral lessons which nature (the best teacher) so liberally teaches us in Queensland; and the result of it all will be that the Queensland climate, operating on agricultural conditions, will yet produce some of the finest men—mentally, morally, and physically—that the world has yet produced. The history of the men of the old countries will yet be eclipsed by the glorious history of the new. I do not consider this picture of agricultural life in Queensland and the possibilities of our Queensland youths in the least overdrawn, I have every confidence in Queensland's sons, and am perfectly sure they are capable of becoming leaders of thought and makers of history. Of course, we are yet in our infancy, and the process of evolution must yet do much for us, but our climate produces the raw material, and time will do the rest. I readily admit there is a large amount of thoughtlessness, disrespect, and irreverence (too much so) in our Queensland youths, which is largely due to climatic conditions and influences. Foreigners pick up certain bad habits very quickly when they reach our shores, and I once heard a man say that when he landed in Queensland he learned to swear before he learned to speak English. I do not pretend to know what language he considered swearing, but our failings are largely surface failings; the strong independent manhood is there all right, and its development in the right direction is

certain. Being viewed in this light, Sir, I am certain that climate influences moral character, and upon the moral character of those engaged in any industry, whether agricultural or otherwise, the success of that industry very largely depends.

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The second aspect under which I wish to notice the effect of climate on Queensland agriculture is in the marvellous rapidity by which it promulgates insect life and produce spests of various kinds. Much might be written under this heading, but I will content myself with illustrating this truth by two or three figures or instances. Who of us who are engaged in agriculture have not noticed what effect a few close, muggy, showery days have had on a field of wheat, and many instances are on record where a field of wheat, beautifully clean and full of promise to-day, has, through a few days or sometimes a few hours of close, muggy, stormy weather, been blighted and ruined by rust. There is no doubt, though, but scientific experiments are overcoming, to some extent, this evil, and very probably much more will yet be done in this direction. I was made painfully aware of the fact that our climate is a terror to breed animal life, only this summer. A neighbouring farmer neglected to cut a piece of lucerne, which was allowed to stand several weeks longer than it should have done; the weather set in close and showery, and in a few days this piece of lucerne was a mass of caterpillars—a little bit of a thing, about $\frac{5}{8}$-inch in length, with a greenish coloured body, a black head, and a decidedly quick movement (for a caterpillar). In a few days the field was black, and when the owner saw what was going on and put the machine in the lucerne they swarmed out in millions, attacked the neighbouring fields, and practically ruined about 200 acres of lucerne in all stages, and inflicted a loss of from £50 to £60 per head on several of the adjoining landholders. Machines were set to work, followed by spring-toothed harrows and in some cases rollers, but the pesky little wretches had their say, and disappeared for the time, no one knows where, nor have any one of those affected by them any faith in any particular measure to check them when they pay us another visit. It is generally believed had the plague appeared in the spring of the year instead of the end of autumn they would not have been got rid of before the winter. Had this have been the case, the losses would have amounted to thousands instead of hundreds. A bit of advice on this pest from any gentleman present who may have had similar experiences would be valued, and I would gladly take back with me the experiences of other men for the benefit of the district in which I live. Much more might be said under this heading; but I have written enough for my purpose, and I am prepared to wager that the Queensland climate can produce pests of various kinds at the rate of nineteen to the dozen when it gets fairly on the job; in fact, Sir, it transforms itself into a mighty incubator, and is prepared to supply all kinds of pests—rust in wheat, potato grubs, orange bugs, caterpillars of various hues and all sizes, &c.—on the shortest notice and the lowest possible prices.

Viewing this question from a scientific standpoint, I have not much to say. Where floods and droughts come from, or where they go to, from what cause they spring, or whether the forces operating to produce these disastrous visitations will yet be brought under human control, is beyond my ken. Wonderful things have been done in the nineteenth century, and who knows but what the control of the natural forces which bring about these ever-varying climatic conditions will yet be brought under man's control and their disastrous consequences averted.

An immigrant writing home to his friends once said, "This Queensland is a wonderful country—you grow two crops in a year; then you lose one with the floods, and the other with a drought." Agriculturists know something of the truth of this saying. Although little or nothing has as yet been done to regulate weather conditions, either to bring rain when needed or keep it away when not needed, there are certain steps that can be taken that to some extent will mitigate the baneful influence of floods and droughts; and I will draw this paper to a close by noticing a few measures that are within the reach of all. I have often been amazed at the apathy and indifference displayed by many people regarding a water supply for a dry time, they simply do nothing, and when bountiful rains fall they let the water run away; no tanks or dams are provided or means to conserve the beautiful water, and a week or two after a magnificent fall of rain (by which they should have conserved a three months' water supply), you see them harnessing up a horse to go a mile, perhaps two, for a cask of water, very often not fit for human consumption. The same system or want of system is carried out in relation to conserving fodder for a drought: no provision is made, none attempted very often; and when the drought sets in and the stock begin to starve, they stump the country side cursing all and sundry because a rain will not come. A good system is that of cropping your land through tillage; treating any land that is deteriorating with manure. These measures—taking steps to conserve the water when it falls, your

fodder for time of need—are possible and within the reach of all; and the man is a wise man who observes these things, and will save himself when the hour of need is knocking loudly at the door of the man who refuses to make these provisions.

The effects of floods can also be to some extent mitigated by a little of foresight, industry, and careful management. I know farms which are subject to damage from flood waters, where the owners never make any attempt to divert the water and save their crops, which could easily be done without injury to others. A carefully planned and carried out system of drainage, which any ordinary man is able to supervise when once he knows his land, would often save his crops and would be of immense benefit in the time of need. And again, many of our farmers—though the number is less than formerly—make no provision for protecting their stock, their implements, or machinery from our disastrous weather conditions. They give £20 for a mower, and leave it standing in the field when not in use; they fix up a chaffcutter or other valuable machinery with no protection from the weather; their drays and wagons have a shed as large as their paddock; they never oil their harness; they never paint their implements; and then they blame the blacksmith, the saddler, the business firms, the manufacturers, for the class of goods supplied. A piece of machinery, which with proper care would last them for fifteen or twenty years, only lasts them four or five years, and then they swear farming is unprofitable and will never pay. They are right; *this* class of farming cannot pay I was pleased the other day, when visiting the Queensland Agricultural College after a week's rain, to find that the students had been engaged during the week in overhauling plant used on the College farm. The whole of the machinery had been painted, every set of harness had been treated to a dressing of oil, and everything about the place was all that one could desire to see; teaching this lesson—that they not only procure the best but, what is harder to do and more important, take the best care of it when they have got it. Sheltering your stock on cold wet nights, draining your lands, taking care of your farm implements, machinery, and harness, are not expensive measures, are within the reach of all, and will go a long way towards lessening the evil effects of long spells of wet weather. I am glad, Sir, that old, sloppy methods are rapidly going into the past and becoming matters of history. It is well that it is so, and that under improving conditions, our increasing knowledge, and our ambition to excel inborn within us, a larger field is opening up, and Queenslanders will yet be in the van of agricultural progress. Taking into consideration the advantages and disadvantages of our Queensland climate, I have no hesitation in giving my verdict in favour of agriculture as Queensland's greatest future industry. We are progressing, moving on and yet moving on, and where the van guard halt to-day the rear guard camp to-morrow.

The Hon. D. H. Dalrymple: It is sincerely to be regretted that the lateness of the hour will not allow us to discuss this paper of Mr. Burgess. I think in coming here, I have found a character in that gentleman, and when he has attained to eminence I shall perhaps be claiming credit for being his discoverer. He seems to me to have a very keen power of observation, and a very neat turn indeed for the poetical power of making word pictures. I do not ask the meeting to pass on to the next paper through any want of admiration for Mr. Burgess' contribution, but as he himself was modest enough to suggest to me that his paper be not read at all, in order to allow of more time being devoted to Mr. Miscamble's, I feel sure that he will not quarrel with my present decision.

Mr. W. Miscamble, of Roma, then read his paper on—

THE NEED FOR EXPERIMENTAL WHEAT PLOTS IN THE MARANOA DISTRICT.

In writing a paper to be read at this Conference on the above subject, I am voicing what is generally admitted to be a long-felt want. In a comparatively new wheat-growing district like the Maranoa, the question is often asked: Which is the best variety of wheat to plant? and from the many hundreds of varieties of wheat that are grown in various parts of the world, the person who is asked the question has to give that answer from his experience of three or four varieties that he has grown himself. Or, if an observant man, he may have noticed in this district eight, ten, or perhaps a dozen different varieties that have come under his observation on the various farms that he may have visited from time to time during the past ten years; and his answer may be any one of the following varieties, viz.:—Talavera, White Lammas, Steinweidel, Purple Straw, Allora Spring, Ward's Prolific, Marshall's No. 3 or No. 8, Budd's Early, or Sullivan's Early Prolific. In the early days of wheat-growing in

the Maranoa, the first four varieties were those most grown. The first two are not heard of now. Steinweidel is still grown on the Maranoa on some farms, and Purple Straw is only grown to a small extent, as in a good season it is very likely to develop the dreaded rust, but in the medium seasons there have been some splendid yields obtained from this variety of wheat. Allora Spring and Ward's Prolific have many staunch friends, as both these wheats have been good yielders when there has been rain enough to bring wheat to perfection, while the others mentioned are new to the district, and have only been planted during the last two or three years with varied results. Then another question very hard to answer is, When is the best time to sow the wheat, and how: broadcast or by seed drill? In the Maranoa district you will find farmers sowing all the way from early in March to early in July. Surely sixteen weeks is a long range of difference of opinion. By early sowing most men hope to escape the rust fiend, and by so doing they may just get caught in a frost such as has happened for the past two years to the destruction of so many crops and with disaster to many a hard-working farmer. Now, I think that there are several good varieties of wheat in the list quoted, and some of the latest varieties may turn out well. But I am of opinion that there are wheats to be found that will be far and away ahead of any of the above for a climate such as ours—Budd's Early, for instance. We read of men on the Darling Downs putting in 17 acres and getting off 200 bags of wheat: a truly splendid yield; and some of our farmers, myself amongst the number, must try Budd's Early, and instead of a yield of 45 bushels to the acre we are miserably disappointed with the odd 5 bushels.

This goes to show that some wheats suit a dry climate better than others, and I think it the bounden duty of the Government, through the Department of Agriculture, to do the experimenting for the farmers, and this should be done in each centre—say, Wallumbilla, where one of the best village settlements in the colony is situated; and the men who went there, many with little or no capital, but with strong muscles and determined will, have cut out of the scrub that then grew in that district very many fair-sized holdings; and, with a little practical assistance from the Department of Agriculture in finding an answer to the vexed questions that I have asked, Wallumbilla would yet turn out to be a prosperous place indeed, and to the very great advantage of the State of Queensland. The same remarks apply to Hodgson and Mitchell; each of these places have from 2,500 to 3,000 acres under cultivation, most of which is sown with wheat.

If there were, say, 300 different varieties of wheat sown on, say, 3 acres of land in each of these three places, all under the same treatment and carefully watched, and the peculiarities of the various samples noted by the Government man in charge, it might result in some half-dozen or more different varieties of wheat being found which might yield from 2 to 10 bushels per acre more. Any extra return such as this would make all the difference between profitable and unprofitable farming. In 1893 I remember a German farmer putting in 8 acres of Ward's Prolific wheat and getting a return of 28 bushels per acre, and he put in 4 acres of Purple Straw and got a return of 16 bushels per acre. This showed a difference of 12 bushels per acre, and as wheat was 5s. per bushel that year it made a big difference. That farm has increased its wheat area to over 100 acres now.

There are dozens of farmers with 100 to 200 acres of wheat in this district; and the right kind of wheat to sow, and the proper time found out when to do so, and the best method and right quantity to sow per acre, mean a very great deal to these men and through them to the district and indirectly to the Government of the country. The pioneer farmers in this district have had a hard up-hill fight, with clearing the dense scrub, fencing in their cultivation paddocks with wallaby-proof fencing, prickly pears, high railway rates on all their machinery and all the requirements of the household, high rates of interest to pay to storekeeper, blacksmith, and money-lenders for all the monetary accommodation that they have been compelled to get to carry on their industry, and the long-continued drought. I claim that they have a just claim on the Agricultural Department for at least these experimental wheat plots, and I hope soon to see not only those plots but a Government experimental farm established in our midst.

Owing to the lateness of the hour, the Conference adjourned without discussing Mr. Miscamble's paper.

FIFTH SESSION.

THURSDAY, 13TH JUNE, 1901, 9·30 A.M.

RESOLUTIONS.

Proceedings commenced by Mr. J. H. MAYNARD (Gympie) submitting a motion, for consideration by the Committee of Resolutions, relative to a Dairy Inspection Bill being introduced into Parliament.

Mr. P. FRANKEL (Brisbane) submitted a motion asking that the Conference affirm the desirability of the opening day of the annual show of the National Agricultural and Industrial Association being included in the list of holidays which it is understood was to be prepared by the Government.

Mr. J. J. DANIEL (Pittsworth) tendered a resolution relative to homestead selection.

Mr. F. W. PEEK (Loganholme) proposed that his paper on a Chamber of Agriculture be referred to the Committee of Resolutions.

All these matters were referred to the Committee of Resolutions without discussion.

Mr. R. S. AIKEN, of Gooburrum, then read the following paper on:—

THE POSITION OF THE CANE FARMER IN RELATION TO THE SUGAR INDUSTRY.

If the result of the late election is any criterion, the time when we shall not have the services of the kanaka is not remote. Whether we shall be able to do without or not, I do not care at the present juncture to offer an opinion. Of one thing I am certain, and that is: this kanaka cry (by whose aid some of our legislators have been enabled to reach their present positions) has been allowed to overshadow other questions of more vital importance to us. Now, it is a very debatable question whether we should urge the matter further or prepare ourselves for the new order of things. My object is to place the matter before this Conference, so that, should the occasion arise, we shall be enabled to view the subject intelligently, and so conduce to beneficial results generally. I intend, in the first place, to consider the financial aspect of the question. This bonus or import duty (call it which you please) that we are offered in lieu of kanaka labour will be paid through the Customs. That being the case, the manufacturer will be the person who will receive it. Now, as by law the manufacturer is prohibited from employing kanakas in the mill, he is not entitled to any of this bonus, because the abolition of kanaka labour directly affects the grower and not the manufacturer. The grower, therefore, is entitled to the whole bonus. Now, gentlemen, this is one point upon which our Labour members have neglected to enlighten us: How is the farmer or grower going to obtain this bonus so as to enable him to meet the increased cost of growing cane by white labour? The ruling price paid to the farmer for his cane is 10s. per ton. The profit as shown by the returns of those central mills which have been fully supplied with cane is £1 per ton. Now, the amount of profit made by the refinery in treating the raw sugar supplied by central mills is very difficult to arrive at, varying, as it does, from 8s. to 50s. per ton. We will suppose it is £1 per ton. Now, if the farmer is to receive that to which he is justly entitled, instead of 10s. he should receive 16s. per ton for his cane, made up as follows:—1s. from the central mill, 1s. from the refinery, and 4s. bonus, which, plus the 10s. now received, would, in all, be 16s. I will show later how this may be obtained from the outset. Here I should like to mention that I do not agree with a number of irresponsible people who hold that those engaged in the sugar industry are simply coining money. On the contrary, I think those who have made money by it in Bundaberg may be enumerated on the fingers of one hand Competition, or rather unfair competition, has had a lot to do in bringing this about. Under present conditions, if sugar is to be profitably produced it must be on a large scale. The days of small mills are gone, and none but huge concerns may be expected to be profitably worked, when the margin of profit is so small. Now, gentlemen, this will result in one of two things: either the annihilation of the small farmer or the small millowner, because the amount of profit will be insufficient for both. By this I mean that either the large millowner will grow the cane himself or the farmers will co-operate on the lines of the existing central mills, and the Government will be required to erect or purchase a refinery, so

that the profits will be received by those who are, as I have said before, justly entitled to them, and they are the growers. By a refinery I do not mean a State refinery, though it is quite possible that the State may be asked to provide the money on somewhat similar lines as has been done to establish the central mills. My objections to the refinery being a *State* one are many, and the main one is that I consider local concerns should be locally controlled. The services of Dr. Maxwell have been engaged for the purpose of demonstrating to the sugar-growers of Queensland how it is possible to produce 2 tons of sugar from an area which hitherto has only produced 1 ton. Now, while I do not for one moment doubt the ability of Dr. Maxwell, I may safely say that the average cane-farmer knows only too well the impoverished state of his land. One cause of this is that hitherto the cane-grower has been receiving such an inadequate price for his cane that he is not left with the wherewithal to tide over one bad season, to say nothing of his manuring and otherwise recuperating his soil. Here I may also mention that the miller in cutting the price of cane so fine has, for the want of a little foresight, in no small degree brought this about. In fact, it must be apparent to him (the miller), as the consequences will be more severely felt by him than by the farmer, who, when he finds growing cane unprofitable, promptly ploughs it out and substitutes another crop. We are told, when we cavil at the low price of cane, that the price of the manufactured article will not allow a better price for cane. If this continues, the result is apparent to everyone, and, to be candid, it means the total extinction of the sugar industry in Queensland. We are also told that our land requires draining, &c. To make myself clear I will illustrate it thus: Suppose one of us is ill, and we call in a physician, who prescribes a long sea voyage. "Well," the patient may say, "your prescription, doctor, is very well, but my circumstances are such that I cannot afford the money for the prescribed voyage." Consequently we may see that it is very easy to *prescribe* a remedy, but hardly so easy to *provide* it. This, I take it, is the predicament to-day of many of the cane-growers of Queensland. Some may say that if an expenditure of £50 will be the means of returning £60 it should be done. My reply to that is, that many of us could better our financial positions if we only had the money when the opportunity occurred. Others may say that the money could be borrowed. Well, money earned is better than money borrowed. Further, why should a farmer have to borrow money to keep up the fertility of his farm, when others are obtaining that which justly belongs to him? Just here I would like to remark, with due respect, that I do not wish to create, or endeavour to create, any ill-feeling between the manufacturer and the grower. At the same time it would be idle to deny the fact that the manufacturers are in a large measure at the mercy of the Colonial Sugar Refinery Company; so much so that they are almost prohibited (except under certain conditions) from making white sugar; while those who manufacture raws have simply Hobson's choice, and have to take what they are offered and be satisfied. Now, gentlemen, this naturally in its turn affects the growers, which is a most undesirable state of affairs, and deserving of our earnest consideration, because it may lead to our obtaining a much better price for our cane, thus enabling us to be in a position to carry out in a practicable manner the scientific suggestions that may be made from time to time by Dr. Maxwell. This brings me to another phase of the question, and before entering upon it I wish to emphasise the fact that I am not assuming the *rôle* of an agitator, as I think we have already, to our detriment, too many of that class in our State. So many evils being evident in connection with the growing of cane, there must be causes for some of them. One of these is the lack of cohesion among the cane farmers. What is required to solve the problem or problems is a large composite organisation of the canegrowers of the State. I do not mean that we should combine to take up an antagonistic position, but we should certainly act on the defensive. We know the manufacturers in Queensland have a union, and lately they appointed delegates to meet those of other kindred bodies in the different States in order to frame a tariff for us. We also learn that labour unions meet in solemn conclave and endeavour to solve the "white Australia" problem. Now, what I want to impress upon this Conference is, that it is not a moment too soon to combine and organise for the purpose of protecting the farming industry. I know in our combination we cannot but benefit the State, because when the farmers prosper so do the tradespeople in the towns, and where the farmers are indigent so also are the tradespeople, because it is an indisputable fact that the agricultural population form the backbone of any State or country.

As time was short, Mr. AIKEN suggested that the discussion on his paper be postponed until the evening session, when a number of other sugar papers were to be read; and this was agreed to.

Mr. Henry Tryon, Entomologist to the Department of Agriculture, then read his paper on—

SOME OBSTACLES TO SUCCESSFUL SUGAR-CANE CULTIVATION.

In presuming, as a delegate from the Department of Agriculture, to speak to you on this occasion, the writer has been influenced by two considerations. First, the fact that the Conference has elected to sit in one of the most important of the sugar-producing districts of Queensland, and that therefore—as it appears—there is a distinct obligation on the part of those present to address themselves to some of the problems that confront those engaged in cane cultivation, or at any rate to endeavour to recognise, by the amount of attention that they bestow on the subject, the very high position that it holds in the State amongst those industries that are denominated agricultural. Then, again, the original programme, drafted by the convener of the meeting, made provision for discussing some of the obstacles to successful sugar-cane culture, arising both from the inroads of disease and the attacks of injurious insects; and an impression was engendered that it was in the nature of things that one, who was known to have given earnest attention to this particular phase of the industry, might be called upon on this occasion to venture some remarks in reference thereto.

For reasons, however, that are apparent it has been decided on the present occasion to limit the treatment of the subject to a consideration of one or two diseases only. These have formed the subject of complaint, on the part of cane-planters resident in the districts that embrace the agricultural coastal lands lying to the north of Broadsound, but which have probably a much wider range of occurrence than such complaints indicate.

As illustrations amongst many of the forms in which these are couched, and of the serious incidents that have given grounds for their expressions, the following quotations from communications received may be given:—

"The loss this year, 19 0, from a disease which is seriously affecting the sugar-cane here has been great, and it is evident that, unless measures are found to remedy the evil and prevent its spreading, it may in a very short time prove a serious draw-back to the sugar industry throughout the colony"—26th October. And, again, "The stool I am sending is in the early stage of the disease, and was dug up to-day, and to all outward appearances the canes were quite healthy, but the disease has started in four or five of them. There are plenty of stools in the district with all the canes in an advanced stage of the disease"—12th November

Again, as recently as the 30th March, we find the Herbert River (Ingham) correspondent of the *Queenslander* writing as follows:—"The rot which appeared some months ago is now very bad." There are grounds for concluding that this disease, which is variously referred to as cane rot, Burdekin rot, or by other similar designations, was—as far as its outward symptoms are concerned—described in a pamphlet issued by the Agricultural Department in June, 1895, entitled "Gumming of Cane" (*op. cit.* pp. 57-8). It is not to be inferred, however, that the mention of it in a memoir dealing with the "Cane Gumming" implies the existence of any similarity, much less identity, between the two cane affections.

A second sugar-cane disease that may prove to be identical with the one which will be the first to be dealt with in the following pages, and which is probably generally prevalent, is thus alluded to by a former manager of one of the central sugar-mills:—

"The disease is a very pronounced one, and has lost me close on 120 tons of sugar this season, in actual cane left on the fields, apart from the loss occasioned by crushing over 4,000 tons of diseased cane"—23rd Nov., 1900.

And there are grounds also for concluding that, in other instances, even greater destruction has been occasioned by a malady identical to that to which this extract has reference.

With regard to these very serious losses experienced by sugar planters in the several districts mentioned, and which must represent a monetary equivalent of many thousands of pounds sterling, it must be admitted that until special investigations have been most carefully prosecuted the primary cause or causes that have occasioned so immense a destruction of sugar-cane cannot be definitely assigned.

It may, however, in the meanwhile be permissible, but with no intention of anticipating the important discovery of their causation, to recite the following facts which in the minds of some cannot but be regarded as being of much significance:—

Fungus No. 1—*Melanconium sacchari.**

In the year 1890 the writer remarked the common occurrence on decayed sugar-cane of a peculiar fungus that was submitted to F. M. Bailey, Colonial Botanist, who

* The fungus associated with the Sugar-cane Rind Disease of the West Indies.

in turn referred it to the celebrated British fungus-specialist, Dr. M. C. Cooke. This the latter described in *Grevillea* (*op. cit.* xix., p. 45) as *Strumella sacchari* [*vid.* F. M. Bailey, "Contributions to the Queensland Flora," Oct. 1890, p. 7, and do., March, 1891, p. 36].

As Dr. N. A. Cobb afterwards remarked:—"This fungus is well known (in Australia) to all canegrowers, being one of the most striking fungi that attack their crop. It occurs in the stalk and leaf after they are dead, or nearly so, in the form of conspicuous black eruptions which in damp weather, especially if it succeeds a period of dryness, exude a black, inky thread. When the eruptions are numerous these threads give the cane the appearance of having made a growth of kinky, coarse, jet black hair." [Diseases of the Sugar Cane, 1893, p. 23.] This fungus that has been named by the able plant pathologist of New South Wales referred to, "Cane Spume," need not be further described, although it may be added that the black threads are composed of myriads of spores, each about one two-thousandth of an inch in length, held together by a glutinous substance.

Since 1890, and as the outcome of some attention to the mode of development of this familiar fungus, it has become evident to the writer that, as already affirmed by the Kew authorities in March, 1894, it is identical with one that G. Massee, Principal Assistant, Herbarium, Royal Gardens, Kew, has named the Melanconium stage of *Trichospharia sacchari*, has shown to be associated with the West Indian cane disease that since 1892 has proved so destructive in Barbados; and has concluded is "a true parasite in the sense of destroying perfectly healthy, living tissues." He also described it as being a fungus "that can effect an entrance into healthy canes quite independently of the agency" of any boring insect. [*Vid.* G. Massee, Annals of Botany, vii. p. 350, 1893.]

It is also evidently identical with the fungus derived from diseased Mauritius cane that MM. Prillieux and Delacroix regard as possibly being a dangerous parasite belonging to the genus *Coniothyrium*, concluding their memoir referred to, in so far as it relates to the fungus itself, with these words: "De tout ce que nous avons dit, il semble résulter que le *Coniothyrium melasporum* peut être pour la canne à sucre un parasite dangereux. Ce parasite s'introduit par les plaies, et il est bien évident que les cannes peuvènt être infectès dès la plantation si elles ont èté bouturées sur des pieds infectées préalablement." [*Bulletin de la Société Mycologique de France*, xi. 1895, separ. p. 11.] (*Trans* . .) In addition to the locality mentioned, these French savants report the occurrence of this cane fungus in Tonkin and Martinique; and despite Sir W. T. Thiselton-Dyer's pronouncement to the contrary, Professor Went's *Melanconium sacchari* from West Java is identical, too, with the West Indian and Australian parasite.

The relation between this fungus and the sugar-cane, in connection with which it exists, has been variously interpreted. Thus Massee concludes that the spores having germinated on the remains of dead leaf bases, scars formed by broken lateral branches, roots, &c., or in the wounds inflicted by boring insects, originate a general disease. MM. Prillieux and Delacroix and A. Howard (Mycologist to the Imperial Department of Agriculture for the West Indies) the most recent investigator of West Indian Sugar-cane Diseases (Annals of Botany, XIV., No. LVI., December, 1900) appear to be of the same opinion. Dr. N. A. Cobb, referring evidently to observations made in the Lower Clarence River district of New South Wales, states that this may not be always the case. "Sometimes (he writes) only a limited portion of the cane shows these appearances (*i.e.*, the characteristic features of the disease), and this is usually the case when the fungus enters through some very small injury to the rind; quite as often, however, the whole cane is attacked, and dies down to the ground."

Went, the great investigator of the cane diseases of the Java plantations, on the other hand, concludes that the fungus of that country, that in other respects agrees with that of the West Indies, Australia, and Mauritius, is always a saprophyte, and lives only on canes that are already dead, or, if introduced by inoculation into a healthy cane, only develops in cells that have died as the result of the injury. Boname also has stated in Mauritius *Melanconium sacchari* only attacks dead canes.

It may further be remarked that it would appear that in all the cases where the relation between this wound parasite and healthy growing cane has been demonstrated, by experiments of inoculation, in which pre-cultivation of the fungus has been employed, only quite local disease has been produced even when slits and notches, as in the case of some of Massee's experiments, were made for the purpose of receiving the living spores. MM. Prillieux and Delacroix give interesting testimony on this point, stating as follows concerning their "essais d'infection."—"La lésion ne s'étendait que de 3 cent. mètres environ au-delà de la plaie qui, disposée selon la longueur de la tige, n'a jamais dépassé 2 ou 3 millimètres. Il est juste d'ajonter que

sur trois épreuves d'infection qui ont été tentées le même jour, un premier pied de canne a été coupé et examiné 2 mois après et un second deux mois plus tard, c'est à dire 4 mois aprés l'infection; dans les deux cas, l'étendue et l'aspect de lá lésion étaient sensiblement les mêmes, à part une teinte un peu plus brunâtre de la région infectèe dans le second cas." (*Op. cit.*, p. 99.) *Trans.*

Again, A. Howard, in recording the results of his inoculation experiments, evidently conducted with special precautions to ensure strict accuracy, and in which need-be punctures constituted the wounds made in the healthy tissue, does not inform us that the parasitic organism occurred more than half-an-inch from the point of infection.

The observations of the writer with regard to the occurrence of this particular fungus in the canefields of the State have not been conducted far enough to admit of a definite conclusion being arrived at as to the part taken by it in effecting cane destruction. They, however, so far tend to support the conclusion that whenever it pervades an entire cane this is already practically dead, or is the victim of some obscure disease, probably of a purely physiological nature, brought about by influences whose nature has yet to be ascertained. The very frequent germination of the spores within the superficial cells of the cut and often fissured ends of stubble, without detriment to the ratoon growth that subsequently develops, seems alone explicable on this hypothesis.

FUNGUS No. 2—*Colletotrichum falcatum*, Went.*

A further significant fact in connection with the cane destruction alluded to is of a nature comparable to that just narrated. It is the existence of another fungus of world-wide distribution—*Colletotrichum falcatum*, Went, in the canefields of Mackay and of the Burdekin, and probably in those of other districts also. For from both of these mentioned the fungus has been found in cane brought under my notice as illustrating a special diseased condition of a most pronounced type. To afford general insight into the appearances that characterise sugar-cane in which *Colletotrichum* occurs, the following quotation may be made from an official report made in March, 1898, by Dr. A. G. Bourne, F.R.S., Professor of Biology at the Madras Presidency College:—"Canes but slightly affected—*i.e.*, only recently attacked—show one or more bright red spots in one or more internodes, and if these are followed up by longitudinal sections they appear as red streaks, which branch at the nodes. It is the fibro-vascular bundles which become coloured. Such slight attacks usually occur somewhere about the middle of the length of the cane. Where the disease is more advanced the colouration extends also to the ground tissue, so that any section shows red patches. Subsequently the central portion of each red patch becomes opaque and white, and acquires a texture like that of a 'woolly' radish—the tissue is in fact dead. Where the disease is still further advanced, portions, first at the nodes and later elsewhere, become black, and at this stage or before, the leaves at the top wither, and the entire cane dies up. Some of the canes only were attacked when sufficiently young to give time for the disease to run its full course; others were attacked at later stages and are yielding a certain amount of juice. Wherever the fungus has been growing in the cane for a sufficient length of time, small black, minute, velvety spots are to be found among the sleeping roots, which look like warts on the nodes."

This particular sugar-cane fungus was first noticed as occurring in Java in 1893. In this year F. A. F. C. Went described it as existing in connection with a malady named "Rod Snot" (*Mededeelingen van het Proefstation West*, Java, 1893). Moreover, it was, during the same year, pronounced by G. Massee as being the cause of a serious "Root Disease" of sugar-cane that had occurred in Barbados. "The fungus" (to use his own words) "under normal conditions, attacking the above-ground portions of the cane, the 'root disease' condition being a modification of the normal form, called into existence by the method of cane cultivation adopted."—*Kew Bulletin*, December, 1893, page 347.

In British-India already the literature relating to a particular sugar-cane disease occurring in the Madras, Bengal, and North-west provinces is quite extensive. Amongst contributors to it, in addition to Dr. H. G. Bourne, whose work is already alluded to, being Lieutenant A. T. Gage, S. M. Hadi, C. A. Barber, C. Benson, Dr. George Wall, and others. A careful perusal of this literature renders it evident that it is almost invariably a disease associated with the fungus now under notice and occurring in Java, Queensland, and the West Indies.

The disease, however, except as described by Lieutenant Gage, "A Note on the Diseases of Sugar-cane in Bengal," Calcutta, 1900, is invariably referred to by the above writers, and erroneously so, in our opinion, as being identical with that attended

* The fungus of the so-called Root Disease of the West Indies and of the "Rod Snot" of the Java planter.

in the West Indian Islands with the presence of the spume fungus, and is described by them as being caused by *Trichosphæria sacchari*, Mass., of which it is the Melanconium form.

That the fungus of "Rod Snot" and Root Disease is only a formation of the so-called "Rind Fungus," rests on the sole authority of the able director of the Royal Botanic Gardens, Kew (Sir W. Thiselton-Dyer). He states—"A healthy seedling sugar-cane was inoculated with the spores of *Colletotrichum falcatum*, and at the end of twenty days developed the Melanconium stage of *Trichospharia*." (*Annals of Botany*, xiv., p. 616, December, 1900.) This positive result, he adds, moreover, "is still open to independent confirmation." G. Massee, who suggested the possibility of such relationship in May, 1894, stated at the time that "The necessary cultures for the verification or otherwise of this point are now being proceeded with." (*Kew Bulletin* 80, June, 1899, p. 177.) But it is not, however, on record that such verification was ever secured. The authorities in British India in declaring this association had, however, as had been admitted, relied on the statement contained in the "Report of the Barbados Commission" of 1895—"It has been finally decided at Kew that *Colletotrichum falcatum*, Went, is simp'y one phase in the life history of *Trichospharia sacchari*, Mas." Thus one is fully justified, until further evidence is adduced, in repudiating the suggestion that the organism or so-called "parasite" whose presence is associated with these two cane maladies are some condition of a single fungus, and not of perfectly distinct ones.

The relation between this fungus of Went's "Rod Snot," and the plant within whose tissues it takes up its abode, has been made the object of experimental investigation at the hands of the Java expert, Professor Went. As the outcome of inoculating healthy canes with pure cultures of the fungus, he concludes that it is the cause of the disease; but that, it being primarily a fungus developing on non-living vegetable matter, it can only establish connection with the cane-plant, where the cells composing the tissue of the latter have been first injured or killed as at the site of some wound, but that when once this connection has been established, it can invade the plant generally, producing the characteristic red-tissue discolouration and other phenomena of the disease; in fact, that it is a wound parasite. He also states with reference also to its occurrence in Java, that in districts where the Red Disease is still unknown its fungus, *Colletotrichum falcatum*, lives on dead cane-leaves, and therefore as a saprophyte. He also mentions that the special injuries that are availed of by this wound parasite associating itself with the living tissue, are more especially the tunnellings of boring insects. This has also been shown to be the case in Bengal, Lieutenant A. T. Gage having recorded that in fifty-eight out of sixty-five instances of diseased canes in which it occurred, the Pinhole Beetle Borer (*Xyleborus*, sp.) was met with. Went also states that in a plantation where sugar-cane is subject to the presence of borers, and "Rod Snot" disease once appears, it will very soon become widely disseminated amongst cane that is as yet unvisited by it, and so occasion much damage; also, in view of this contingency, that whenever on a field of cane the presence of the disease has been detected by splitting open some of the stalks (when the red discolouration will be revealed), the immediate crushing of the cane will result in loss being obviated. Insect borers of sugar-cane of more than one kind are to be met with in Queensland, as you are aware, as well as Java, and, possibly, one of the Pinhole Borers also, belonging to the genus *Xyleborus*.

Went has stated, insomuch as the special fungus now referred to is generally met with, not as a parasite, but supporting itself upon dead plant tissue, "its mere presence on diseased cane (where, it may be, it may also manifest its occurrence by occasioning red tissue discolouration—H.T.) is no evidence for its being the cause of the disease." (*Annals of Botany*, vol. x., 1896, p 588.) This is a consideration that the investigator must not lose sight of when manifestations in this state of cane disease, in which the presence of *Colletotrichum* is a conspicuous feature, are being inquired into.

HOW A TENDENCY TO DISEASE MAY BE BROUGHT ABOUT.

Now, in view of these facts relating to the occurrence of two potential disease-producing fungus organisms in Queensland, a certain emphasis has been laid upon the fact that under general circumstances they are saprophytes, and subsist upon dead cane, and possibly other vegetable matter also. It may again be remarked that there are grounds for concluding that such organisms as these, whose parasitism may be described as merely facultative, can only establish injurious relations with the sugar-cane when this is the victim of certain conditions, the existence of which is, however, a matter of inference only, in the absence of special manifestations,

Amongst such unpropitious influences are usually accounted those of soil and climate. These may be permanent or temporary in their operation. Amongst the temporary we may include excessive rainfall or dryness, and an unusual poverty of sunshine.

The persistent uncongenial circumstances of growth alluded to, embrace, on the other hand, not only a meteorological element, but may also be connected with the physical and chemical nature of the soil. And they in turn may be regarded from two points of view—that of the requirements of the sugar-cane considered as a whole as a special division of the order of grasses, and that of the demands of the individual cane variety. In the latter case we may trace their effect when, as often happens, particular sugar-cane varieties, having a reputation for vigorous and healthy growth, fail to sustain it when transported to a new location, and possibly manifest the fact in being attacked by a disease-producing parasite of the nature of these already alluded to. It is by reason of this experience also that sugar experiment stations find it necessary to establish sub-stations where there are special soils and climate within the canegrowing districts coming within the scope of their operations. It also points to the obligation that resides with every cane-farmer to test the capabilities of different sugar-cane varieties under the conditions of soil and climate that are exhibited by his immediate surroundings, availing himself of such expert assistance as he can enlist in estimating results.

It may be further added, as a matter not generally recognised, that the disposition to be victimised by parasitic life that a particular cane variety exhibits, either locally or throughout extensive districts, may possibly follow as the outcome of our own strenuous efforts in cultural procedures, or, on the other hand, be the result of inaction on our part. It is a very common persuasion, especially on the part of those that do not favour the bestowal—of course as a matter of principle—of much tillage upon cane lands, that any unfavourable modification that is displayed by the plant in process of growth is the expression of a state of soil poverty that has been arrived at. There are, however, grounds for concluding that instances, in which an explanation of the display of a tendency to disease is to be found in the concurrence of this circumstance, are very much less numerous than is generally supposed, and that many apparent ones will readily disappear on resort to practice of ordinary farming procedures, other than those that consist in the application of manures and fertili ers. The visit to Bingera Plantation on the part of the delegates this afternoon should afford emphatic testimony of the truth of this proposition.

With reference to the possible tendency of operations prompted by a desire to possess a sugar cane of the highest quality, and in greatest amount, in promoting a disposition to disease, allusion need only be made to what may be the outcome of efforts purposely directed towards securing a high sucrose yield as the exclusive end to be obtained, without regard to the fact that this gain may accompany—as a condition of vital plant-equilibrium—a proportionate deprivation of essentials—obscure, it may be, in their nature—on the possession of which the health and vigour of the plant may depend.

How this undesirable result may be realised while in other respects an improved cane-plant is being acquired, will appear from what is to follow.

Now, a very simple experiment teaches us that the primary and fundamental element of plant structure—*i.e.*, the cell—is endowed with a cell-wall, whose elasticity, although variable within certain limits, is circumscribed. This elasticity is occasioned by the necessity that arises as a feature in plant life for meeting the varying internal pressure of its contents—that is, the so-called cell-sap. Experiment will also indicate that when, as commonly happens, the plant becomes turgid or full of sap, the limit of this elasticity is practically reached—a statement that especially applies to the plant-cells that contain sugar in solution.

Professor Pfeffer has shown in experiments with a single cell that when the dissolved sugar-forming part of its contents was increased from 1 per cent. to 6 per cent. in amount, this internal pressure correspondingly changed from a mercurial pressure of 53 cm. to 307 cm. Now, to meet this increasing cell-pressure, which is of course additional to that due to full plant turgidity, a cell-wall of greater resistance must be provided for, and there are grounds for concluding that this requirement can only be complied with by developing in the sugar-cane its mineral constituent that principally exists, and especially is this the case with lime in the cell-wall.

Thus it would appear, the grower should aim in securing a cane with a high ash constituent as one of the concomitants that he endeavours by selection to associate in the cane with a high sucrose content, the mineral matter being principally inherent in the cell-wall, and the latter being resistant and strong in proportion to the extent in which this is present.

In proceeding to view the matter from a chemical as opposed to a physical standpoint, it may be stated that with regard to the contents of the cell itself, it must be confessed that our present state of knowledge is inadequate to admit of a pronouncement being made with any accuracy as to the special modification of sap-composition that should be affected to meet the altered condition arising from the presence of sucrose in increasing amount.

But in reviewing as far as practicable all the circumstances connected with the life of the plant, it would appear that what in this respect the higher sugar contents necessitates, is, amongst other things, that the cell-sap should be endowed with an increasing amount of lime. Now, with regard to this element whose presence is an essential to the maintenance of the healthy existence of all higher plant life, some of you are fully aware that, although in the case of the cane plant, great benefit in the direction of sugar yield is derived from its use, and that, moreover, it is taken up from the soil with avidity by it, yet the precise nature of the important part which it thus plays in its economy, considered as a living organism, is not yet ascertained.

But to pass beyond the limits of demonstrated fact, and assuming, as a matter of high probability, that the oxalic and citric acids—derived from the sugar that occurs in the cell-sap, and especially so when this sugar is under the influence of lowly organisms of normal occurrence—that occur in the sugar-cane, do so in amounts proportionate to that in which the sugar itself (*i.e.*, formative sugar) is present. The maintenance of the health of the plant would demand that an increase of lime be forthcoming in order to prevent, by chemical union with them, these acids from interfering with the function of those enzymes whose action, as modern research indicates, is the basis of the exercise of one of the most fundamental functions of plant-life—viz., metabolism—*i.e.*, the systematic binding up or breaking down of food material within its tissues by definite successive changes.

The bearing of these propositions relating to the promotion of a tendency to disease that may attend our efforts at so-called sugar-cane improvement, will be apparent to many of you on your reflecting that when an outbreak of disease is experienced in our plantations it is the "best" canes that usually suffer most; and to those few of you who, having—as has been the case with the writer—been privileged to examine the wild progenitors of some of our cultivated varieties, have observed that these are invariably healthy or free from disease.

From these latter considerations it will appear that an inquiry into the origin of a sugar-cane disease may be something more than discovering an organism of microscopical dimensions endowed with the faculty of producing a more or less serious alteration in the plants in whose tissues it has established itself, and demonstrating that this be so. In fact, it will be apparent that it may involve investigation far more profound and complicated than is this, and one whose range has infinitely greater breadth. They will also suggest that similarly the control of a malady affecting the sugar-cane may only be arrived at as the outcome of the expenditure of much time and labour in elaborate physical and chemical research.

This important conclusion was forced upon the writer when engaged in investigating the gumming in cane disease in the Bundaberg district some years ago, and finds expression in the memoir embodying the results of the inquiry that was then undertaken.

It was indeed the many difficult problems pertaining to the subject alluded to, and the impossibility of solving them until further facts regarding the life of the cane plant had been elucidated, that prompted the suggestion being made with which the report concluded, viz.—that a fully equipped and organised sugar experiment station be established. This suggestion, as you are aware, has happily borne fruit, and it augurs well of its success from the point of view of a student of some of the obstacles to successful sugar-cane culture, that both in the *personnel* of its directorate and executive, it will provide exercise for the talents and ingenuity of one, at least, whose reputation as a physiological chemist has not only been widely admitted but justly earned.

DISCUSSION.

Mr. THOS. BINNIE (Cairns) stated that it was a fly, something like a mosquito, that bored the holes in sugar-cane and sucked the juice as described by Mr. Tryon, and not a fungns.

Mr. F. W. PEEK (Loganholme): The least we can do is to thank Mr. Tryon heartily for bringing his paper forward. We want a nomenclature committee for the naming of diseases as well as for the naming of varieties. We have had diseases of cane in my district, and Mr. Tryon came down, spent a few weeks amongst us, and thoroughly investigated them. He gave us their true names, properly explained their causes, and gave us remedies. There are obstacles to cane culture, which Mr. Tryon did not touch upon, but upon which

we can. Mr. Tryon states the best cane suffers most, and he could have added that the one least able to suffer is the principal victim. This is a big subject to deal with, however, within a five-minute limit, and, were I to give one quarter of the obstacles to successful cane culture, I might talk to the end of the session.

Mr. L. G. Corrie (Brisbane): As one who has followed Mr. Tryon's work ever since I came to Queensland, I should like to thank him for his paper. A great deal of it was beyond me, but there was one hint thrown out which is an exceedingly important one, when the eyes of the canegrowers are looking towards the improvement of cane, and it was that in the seeking after a cane having a heavy sucrose content we would have to guard against the securing of one not suitable for commercial cultivation. Mr. Tryon has doubtless followed out what has been done in the West Indies in this connection. There are two ways by which it is hoped a cane will be arrived at which through its sugar content will solve the difficulty of the production of cane sugar in opposition to the production of bounty-fed beet sugar. One is by arriving at a cane of a higher sugar content through a seedling, and the other is by the selection of cane. It has been recognised that when you get through a seedling, what may be termed a "sport" in connection with some well-known variety, it frequently shows, by analysis, a very high sugar content. But when you come to grow it you will perhaps find that you have a cane that does not give a good yield, or has some other undesirable characteristic. The lines, therefore, laid down in the West Indies in this connection should be a lesson, as Mr. Tryon points out, to those of us in Queensland who are following up the same investigation. A high sugar content is a most important consideration in a cane, but with it you must have other good and indispensable qualities. As one who is trying to do something in the direction of the improvement of sugar-cane varieties, I must say that I am glad to be in a position to be able to thank Mr. Tryon for his paper.

Mr. John Fielding (Blenheim): I think it is due to Mr. Tryon that I at least should express my approval of the work he has done. I have noticed always a certain amount of impatience when technical terms are used. As agriculturists, we develop a certain kind of impatience when anything is presented to us which is not quite clear. Perhaps some may think it is presumptuous in me saying anything on a subject pertaining to sugar, but I was once engaged in sugar in a small way, and, in fact, I believe I was on Oxley Creek when the first shipment of plants came to that district from Cleveland. I afterwards engaged in the industry myself, and remember a disease that appeared on the Brisbane River. It showed itself first in a variety that was called the Malabar. There were spots on the leaves which gave the disease the name of "rust." Then the plants began to die off, so that ultimately we had to cast away that variety altogether. As to the value of the paper that has been read, we here cannot exactly estimate it. With regard to Mr. Tryon's work in the State, I remember a great service once rendered by him to a fruitgrower. A gentleman had planted a great number of Japanese plums. He had spent a lot of money in the venture, but just when the fruit were about fit for gathering they began dropping from the trees. The man was almost demented, but Mr. Tryon came up and immediately detected, in the ground at the foot of the tree, the insect that was causing the trouble, with the ultimate result that a satisfactory solution was found for it. As regards cane culture, I feel sure that he will be able to do as good service for it as he has done for the fruitgrowing industry.

Mr. H. Tryon: I must thank the audience for the patient way they listened to what I had to say. This is the first occasion on which I have attended an Agricultural Conference, and I did not exactly know the nature of the proceedings that were adopted at these gatherings. Otherwise I might spoken in possibly a less technical language. But I had to deal with a technical subject, and one had to use technical terms in dealing with it. With reference to technical terms generally, I find that those who are really interested in a subject will make it their business to understand the technical terms connected with that subject. Of course, I must thank the gentlemen who have spoken

for their kindly expressions of interest in my work. When I came here I was under the impression that a conference of agriculturists was a highly important matter, and I thought that it was a duty of those who attended that Conference to put forward some of their very best effort, and therefore to treat all matters in a very serious light. Doubtless, had I delivered to you a popular lecture I might have interested you more, but I have written a paper which I hope shall be read, and when you do read it you will perhaps find a little more in it than you may now think is present.

STATE AID TO CARRY OUT SCHEMES OF DRAINAGE ON PRIVATE LANDS.

Mr. N. J. MIKKELSEN (Yandaran): As a representative of the Avondale Planters and Farmers' Association, who have submitted this matter for the consideration of the Conference, I may explain a few of the reasons why we ask for State aid in drainage. In my opinion drainage ranks before tillage or manuring. A man may till and manure as much as he likes, but unless he has drainage his crops will rot in the ground. I have not come here with an axe to grind, but shall better illustrate my meaning by specifying a particular case. Some time ago I purchased a piece of new land, and got it ready for a crop. About six or seven weeks ago we had an abnormal fall of rain, and when I came to look at this piece of ground it was a lake with about 3 feet of water over the whole lot of it. Previous to that it looked a lovely piece of land. My land was not the only piece of ground that was submerged, and three of my neighbours and myself clubbed together for inaugurating a system whereby to have the whole lot drained. It will mean half-a-mile of drainage 6 feet wide at the bottom and 10 feet at the top, and I can see that if a single individual had to face a job like that the farm would be left to the frogs and the mosquitoes. This would be a pity, for it will be found that the low-lying lands in Queensland are always better than the higher, for the simple reason that the latter do not get enough moisture to enable them to grow good crops. Therefore, if we can drain our low lands so much the better. I am not in favour of asking the Government for anything unless it is for a national purpose, and I think in this instance the Government might lend the divisional boards a limited amount of money to deal with the question. Personally, I do not want anything, but I am only pointing this out as what might, and should in my opinion, be done. Application could be made to the local authority for an amount to carry on drainage with, and this amount could be made redeemable in twenty years. I may say, in conclusion, if Queensland does introduce such a measure she will not be the only country that has done so. In my native land, Denmark, the system is carried out on a very extensive scale indeed.

Mr. R. S. AIKEN (Gooburrum) thought the matter brought up by Mr. Mikkelsen could be dealt with by the divisional boards.

The Hon. D. H. DALRYMPLE: This matter came up for discussion, I believe, two years ago. I remember reading a report on it, and I think Mr. Chataway said there were some difficulties in regard to getting outlets for the drainage water—that is to say, in order to drain it was necessary to have a place whereon to drain; also, that the law on the subject was somewhat dubious. Personally I admit that the problem of drainage is a very important one. If the gentleman who has introduced the discussion will communicate with me I shall do my best to ascertain whether any more information has been gained with regard to the existing law, and the necessity for amending it.

THE NEED OF EXPERIMENTAL WHEAT PLOTS IN THE MARANOA DISTRICT.

As time permitted, a short discussion was held on the paper by Mr. W. Miscamble, of Roma, which was read the previous evening on the above subject.

Mr. W. DEACON (Allora): There were one or two questions brought up in connection with that paper on wheat which should be answered, and amongst

them is that of drill *versus* broadcast sowing. On the Downs we find the drill best for several reasons, one being that it puts the seed in at an even depth. Broadcasting does not. Another point is, that the drill evenly distributes the seed. In broadcast sowing you have got to sow the day after the rain, or else you run the risk of the seed not coming up. Broadcasting entails a lot of harrowing, and harrowing dries the land. On the other hand, you can drill for a fortnight after the rain, and then the seed would germinate Drilling saves seed, and in fact saves the price of the drill. Forty pounds of seed drilled is as good as 60 lb. sown broadcast. By that means you save 1s. an acre, and in 100 acres you will save £5. As a drill costs from £25 to £30, you soon save that, or, at any rate, you make the interest on the money, even if you have to borrow it. As for the kinds of wheat, that may depend upon the climate. One wheat will do well one season and badly the next. Allora Spring is a splendid wheat in an ordinary year, but frost injures it more than any other variety, and the last big frost destroyed all our Allora Spring. Budd's Early resists the frost much better. The bad year I had 120 acres. It was nearly all destroyed except about 120 bags, which, by the way, went to Roma. Allora Spring is a wheat that easily germinates, and it is a wheat that will stand drought better than any other sort. An excellent wheat, and one introduced by the Agricultural Department, is the Belatourka. This did as well as any wheat we had last year. As for Purple Straw and White Lammas, we abandoned them on the Downs years ago, although the White Lammas is about the best milling wheat in existence. Mr. Miscamble mentioned the Steinwedel, but it is a wheat that I do not like. I sowed it three years in succession, but would never try it again. The first year it did very well, but it was no good the succeeding. I am not going to say anything against the Marshalls except this: and that is, I shall sow no more of them. A new wheat introduced by the Department last year was the Blue Stem, but the seed imported was, unfortunately, not pure Blue Stem. I put in 4 bushels of seed, and got a return of about 20 bushels to the acre. If we could get pure seed, I think the Blue Stem would be a very desirable variety for Queensland. As for the time to sow, of course, as Mr. Miscamble said, it may be a long one. I know one individual who put Spring wheat in on the 4th August and got a splendid return. The farmers have been delaying sowing on account of the unprecedented frost we got two years ago. We never had such a frost before, and may never get one again. I believe in early sowing—about the last week in April or early in May. There are some wheats that you must sow early. I think the grain is heavier and the yield much better if you sow early. The wheat for one thing has more time to root. If the Government does establish experimental plots in the Maranoa district, a man should be stationed to look after them the whole time, and not appear on the scene only at sowing and harvesting times.

Mr. J. WILSON (Freestone Creek): The advantage of sowing with the drill is, that the wheat roots better, and when the plants in a drilled field ripen they are all of the one height A man who once tries drilling will never go back to broadcasting. The first year I used the drill, the extra return repaid me the cost of the drill. With regard to varieties, no man can tell which is the best. The Department is testing varieties at the experiment farms at Westbrook and the Hermitage, and it is a pity the knowledge to be gained by a visit to these farms is not more generally availed of. We wheatgrowers are the people who are going to make Queensland what it is to be. Our whole interest is in growing wheat for Queensland. If Brisbane is going to be a seaport town, our vessels must be loaded with wheat, and if we can get right down to the port they will be. I have not the slightest fear of federation if we get a fair chance to get to our port. We have land equal to anything in this world, and we have men who can use it.

The objects of Mr. Miscamble's paper were also very ably supported by Mr. J. SCANLAN, of Helidon, and Mr. J. DANIEL, of Pittsworth.

Mr. JOHN FIELD (Laidley): As many will remember, the late Dr. Bancroft took a great interest in the subject of wheatgrowing, and imported a great many varieties from India. I got eleven of these varieties from him. I was very careful in planting them, and found, as was natural, that some were a great deal more suitable for the Lockyer district than others. Three or four of the kinds seemed to do particularly well, and amongst these were some bearded sorts. When I came to make hay of them and sent it to Brisbane it was condemned on account of the beards, these being considered objectionable in the hay, as they stuck in the palates of the horses, although I found on my own place that it was quite practicable to use it. Later, when the Lockyer Society was established, we imported a number of seeds for distribution amongst our members, and included in these were a number of wheats from Roseworthy, South Australia. Amongst the wheats that were experimented with in the Lockyer district was one known as Leak's Rust Proof, and I am reminded of this by Mr. Deacon's reference to the Blue Stem. I think both the Talavera and the Leak's Rust Proof belong to the same family of wheats, as they both exhibit a blue stem. These wheats are slow growing, but they are very hardy and resist rust. Another variety that has proved suitable to the Lockyer district is the Belotourka. It will grow as high as your head, is very robust, and will make very good hay indeed if cut before its beard gets objectionable. I can easily see that, in the increasing wheatgrowing district of the Maranoa, there is a great need for experiment plots to test certain varieties of wheat, and that this is a step that we, although living in other parts of the country, should by no means object to, but, on the contrary, encourage to the best of our ability.

Mr. T. E. COULSON (Rosewood) said he desired to thank Mr. Miscamble for the pleasure he had received in listening to his paper.

Mr. W. WILLIAMS (Wallumbilla): In the Maranoa district there are a number of wheats that do well on the Downs, but that do not do well there, and *vice versâ*. For this reason we want the Department to establish some wheat plots or an experiment farm or the testing of varieties. An individual cannot carry out these experiments, and if the Government could accede to our wishes in this matter it would be a great boon to wheatgrowers of the Maranoa.

Mr. P. BIDDLES (Tiaro): Some years ago there was a flourmill erected at Maryborough, and the farmers in the Wide Bay district were asked to grow wheat. I was an old wheatgrower, so, along with a number of others, accepted the invitation, and got a number of different varieties, including Talavera and Velvet Chaff. The best of them, however, was the Belatourka, but most of the other sorts were not of much use. The upshot was that the farmers gave the wheat up, although what did grow gave a return of from 40 to 60 bushels to the acre, and although the experiment had cost them a lot of money. I think it would be a splendid thing if the Government made arrangements with farmers in different parts of the country for the loan of a piece of land on which to experiment with seeds for the benefit of the district. Such a system would cost very little, and would be of great value to agriculturists.

Mr. A. H. BENSON (Agricultural Department): For years before I ever saw Australia I had a good deal to do with wheat. I experimented with wheat in California, and was growing it in the Lothians of Scotland and in many parts of Scotland. I take it the growing of wheats is not simply a question as to whether you can grow such-and-such a wheat in a particular district, but whether you can grow a wheat that will produce the most flour and the best flour—flour that will make the best loaf of bread. With regard to Mr. Miscamble's paper relative to the desirability of growing in the Maranoa district varieties for the purpose of testing their suitability to that district, I may say that I am decidedly in favour of different types of wheat being tried throughout the country particularly with the view of learning their milling qualities. As Mr. Miscamble said, there is no question that many wheats which do well on the Downs do not thrive in the drier district of the Maranoa We, as a Department, are conducting experiments in the dry region of the State. We are growing

wheats at Gindie, on the Central Railway, where there is a climate, hot and dry in summer, very similar to that of the Maranoa. The results of the experiments conducted at Gindie will largely apply to the conditions of the Maranoa, but, if my Minister sees fit, I think it could be possible, if individuals would offer, say, 1 acre of land, to supply seed to them for the object of learning the most suitable varieties. It would not, at any rate, cost a great deal of money. The first thing in wheat that we have to consider is the growing of varieties that are of the highest milling value and rust resistance. Those are qualities that can only be determined by actual experiment in the different districts. Another thing we should do is to attempt to breed wheats in Queensland that will be adapted to Queensland conditions, that are of a high milling quality, that will resist rust, that will resist frost, and, finally, wheats that will produce a flour that will keep and make a good loaf of bread. It is not merely necessary to test a few varieties of wheat and see how they will grow, but we must carry on the experiments by testing the flour and the baking quality of the flour. It has been done in other parts of the world with very good results, and I see no reason why this class of work could not be carried out in Queensland with great advantage to everybody.

Mr. J. Wilson (Freestone Creek) agreed with Mr. Benson in his remarks relative to the desirability of wheats being tested with regard to the quality of the flour they made.

Mr. W. Miscamble (Roma): I do not think I have much to reply to, and I must thank you all for the kind way you received my paper. As far as I could judge, all the speakers were agreed as to the necessity of experiment plots not only for the Maranoa but for any other district in Queensland that grows wheat. I have great hopes of the Maranoa being one of the great wheat-growing districts of Queensland. I am not afraid of the Darling Downs, nor am I afraid of Victoria. We want to get facilities for marketing and the right sorts of wheat. We can only get the latter by the Department establishing in each centre experiment plots, or better still an experiment farm. It is too much to ask one farmer to do the experimenting for a whole district. If we conquer the scrub I think we are not asking the Government too much when we ask for assistance to help us over our difficulties. We are striving in the West to overcome difficulties not only of drought but the difficulties in the way of clearing the land. I mentioned some Purple Straw wheat. That was brought over in 1893. It is a beautiful wheat, but liable to rust. During two of the years it was grown in my district, it meant ruination to the farmers who grew it, but in a good season I have known eleven bags to the acre being obtained from Purple Straw. Ward's Prolific is a good wheat, but we cannot all grow Ward's Prolific. We want different varieties, so that we can make the best flour to put upon the markets of the world. I look to London for the market for the wheat that is to be grown in the Maranoa. I do not think the day is far distant when we will be competing in the London market. To-day, in the Maranoa, we can grow wheat for 2s. 9d. a bushel, and find it pays us better than 5s. a bushel used to eight years ago. As a Victorian who has come to Queensland, I may say that I think we have a better country than Victoria. I think we have a better district in Roma than I had in Victoria. Give us right conditions, fair railway rates, and the proper wheats to grow, and I am sure we will come out successful, to the benefit of ourselves and to the State of Queensland in general.

The Hon. D. H. Dalrymple: Assuming what we all admit, that in growing wheat in the West great difficulties are to be met with, it is gratifying to hear from Mr. Miscamble that he looks upon them as difficulties that will be overcome. Mr. Miscamble has told us that the West is as good as Victoria. We know the large output that takes place there. He looks forward also to the export of wheat ultimately to the markets of London, and I trust his hopefulness will be justified by events. Something has been overlooked, however, for admitting that it was desirable to try experiments in the Maranoa, I must

remind Mr. Miscamble that experiments have been tried there. As far back as 1893, and for a number of succeeding years, a series of experiments, with varieties of wheat, were carried out, under the auspices of Professor Shelton, at Roma, on the farm of Mr. P. Smith. Then, again, wheat has been tried, and is still being tried, at the Gindie State Farm, near Springsure, in what may, perhaps, be termed the Western district of Central Queensland. You are all doubtless aware of the experiments in wheat that have been conducted by Mr. Mahon at the Agricultural College, and altogether the Department has evidently been alive to the necessity of trying experiments under varying conditions. But the conditions, after all, in certain parts of the country, although those parts may be great distances from each other, need not necessarily vary to any great extent. The differences, for instance, between Roma and Toowoomba would be vastly greater than those between Hughenden and Roma, or Winton and Roma. That is to say, the conditions out West, and within certain limits, are similar in the various localities. The Department has tried experiments in wheatgrowing in the Western country, and I am not going to say that it is indisposed to try them again. But we have already got six State farms and nurseries, and I must ask the delegates to look facts in the face. A considerable amount of money is devoted to the Department of Agriculture. and very profitably so I think. We have, however, to consider a very serious deficit this year, and I must ask them to remember whatever disposition the Minister has to extend his operations, his willingness is curbed by the necessities of the Treasury. Experiments are going on in the West, and I trust they will be profitable. I am sure that farmers, as a body, are less disposed to expect State help than any other class of men I know that in certain of the sugar districts experiments are being carried on by planters with regard to the effects of different manures. If farmers can obtain seed, let us say through the Department, of different varieties of wheat, which are believed by the experts to be probably favourable and likely to succeed in special districts, then I do not think it is too much to hope that farmers will undertake small experiments. It does not appear to me to be a work affected by difficulties that farmers cannot overcome, provided they get seed free of cost from the Department, to devote an acre or two to a number of varieties, and study the results from those varieties. I hope the Department will allow of this being done, if the Treasurer permits. I believe there is no more legitimate function for the Department to undertake, and I believe there is reason to hope that the effort on the part of the State will also be supplemented by individual enterprise and individual experiments on the part of the farmers themselves. On the testimony of the gentlemen present, I was gratified to hear that a number of varieties of wheat imported by the Department had been found very suitable to the country.

Mr. J. DANIEL (Pittsworth) asked why, after growing a newly introduced wheat for a few years, it so often seemed to deteriorate, especially in its rust resisting qualities?

Mr. W. DEACON (Allora) said his experience of newly introduced varieties was generally the opposite, and he instanced cases of wheats that were very rusty the first year they were grown in the colony, but which afterwards improved out of all recognition.

VISIT TO BINGERA.

On the afternoon of Thursday, the 13th June, the delegates visited Bingera Sugar Plantation, where they were hospitably entertained by Messrs. Gibson and Howes. The delegates were specially interested in the preparations for the vast irrigation scheme that was to be inaugurated on the plantation, and these were fully explained to them by the proprietors. At the conclusion of the luncheon the Hon. D. H. Dalrymple, on behalf of the visitors, thanked Messrs. Gibson and Howes for the kindness with which they had been received, a sentiment which was heartily echoed by everyone present.

SIXTH SESSION.

Thursday, 13th June, 1901, 7·30 p.m.

Proceedings commenced by Mr. R. C. Lethbridge (Mitchell) moving, and Mr. P. Hoskin (Hodgson) seconding, that Mr. W. Miscamble's paper on Experimental Wheat Plots be referred to the Committee of Resolutions. This was carried.

The Hon. D. H. Dalrymple: I find there is a deputation of two or three gentlemen outside, so I must ask your permission to absent myself for five or ten minutes. I shall therefore, with your permission, ask Mr. Mahon to take the chair.

Mr. Mahon accordingly assumed the chair.

POLYNESIAN LABOUR.

Mr. A. Moffat (Radford): I beg to move the following motion:—

That this meeting of 160 delegates, assembled in Bundaberg from all parts of Queensland, and representing every agricultural and pastoral interest of this State, are alarmed at the action proposed to be taken by the Federal Government against the employment of Polynesians on our sugar farms, and we therefore ask the Federal Government to postpone legislation on this subject until a Royal Commission has reported to the Federal Parliament upon the whole question.

Mr. T. Burgess (Forest Hill): It is my duty to second the resolution proposed by Mr. Moffat. I may be pardoned for saying if I had been asked to do this before I came to Bundaberg, I should have refused; but I second it now because I appreciate the sentiment and believe it is the right thing.

The motion was then put and carried amidst applause.

Mr. Moffat: I would like it to be distinctly understood by everyone what we are doing, and I would like the Chairman to ask if there is any dissentient voice against the spirit of the resolution.

The Chairman therefore again asked if there was anyone opposed to the motion, and, meeting with no response, it was declared carried unanimously.

The next paper on the business-sheet was one by Mr. E. Denman, of Etowri, Mackay. Mr. Denman, through indisposition, was unfortunately absent, and his paper was accordingly taken as read. It was as follows:—

THE SUGAR INDUSTRY.

[By E. Denman, Etowri, Mackay.]

Mr. President and Gentlemen,—The pride and pleasure which I feel in again being present at this Conference are marred in a large degree by the sad reflection that, since we last met, the Department of Agriculture has lost a most capable administrator and the agriculturists of Queensland a very sympathetic friend by the death of the late Honourable and still honoured J. V. Chataway. I also regret that on the present occasion another was not chosen by my association to bring to your notice the woes and the wants of the Northern canegrowers in particular and sugar industry generally, seeking your aid and co-operation to soften the former and to secure some of the latter.

I may here say that my colleague, Mr. Swayne, and myself have also been deputed to act and speak for the Proserpine farmer on this occasion. This will compel me to refer to the past. When possible, the very best thing that can be done with the unpleasant past is to divide it into two halves—forgiving one and trying to forget the other. My excuse for resuscitating it on this occasion is that I am going to apply it to its only legitimate use—viz., as a warning; for the past is ever the only true prophet of the future.

On the Proserpine there is a large and well-equipped central mill, erected under the provisions of the Sugar Works Guarantee Act. There is a large debt due on it to the Government, and a course of action is being pursued which, if persisted in, will drive the cane farmers off the land (the only source from which the wealth required to meet the debt can come), leaving the mill machinery and building a costly monument to one man's folly.

Ten shillings per ton is the price fixed for cane. I say that the Proserpine farmers cannot grow cane profitably at that price. Ten shillings per ton of cane is

not its commercial value at the present price of sugar. Every well-equipped and well-managed mill can well afford to pay 13s. per ton; in fact, at the present time, both central and privately owned mills are offering as much as 14s. 6d. per ton. As this mill has been taken over by the Government, I trust they will see into this matter, as already farmers are talking of abandoning cane cultivation. The whole question of the price of cane may yet claim the attention of both State Legislature and Commonwealth Parliament with the view of securing to the cane farmer his fair share of any protective duty which may be imposed. The Dominion Parliament of Canada recently appropriated a considerable sum of money to encourage the manufacture of sugar from beets, and they stipulated that the price paid for beets must not be less than 4 dollars, or 16s. 8d., per ton. Considering that the sugar industry was, from its inception, a State-encouraged if not State-created industry, that it is a State-regulated and State-harassed industry, that the State has a very large direct pecuniary interest in it, and that at the present time it presents to the Commonwealth a most serious problem for solution, would it not be the wisest course for that body to convert it into a national industry?

I now come to that much-discussed but generally little understood question, the ever verdant political war cry—kanaka labour. Dr. Thomatis, at the last Conference, aptly termed it an industrial question. Originally it had neither an industrial nor a domestic aspect; neither was it a question of race or colour, for many of the earliest agitators for its abolition were men who, like myself, held the opinion that a man's country, creed, colour, and condition are each and all pure accidents, for which he should not be penalised; and history shows that where any of these entailed disabilities the country which imposed them suffered thereby.

The old saying, "A man's enemies are they of his own house," applies in a remarkable degree to the sugar industry. Unfortunately, ill chance, in the early days, often placed in charge of mills and estates persons ignorant of the business, unused to control and direct men, and devoid of tact in dealing with them. These people made both the most and the worst of their little brief authority; their arrogance alienated their employees, who frequently saw South Sea Islanders placed, generally only temporarily, to do work from which they had been peremptorily dismissed for slight cause. In dealing with the cane farmers, the purchasing of cane was rarely made a strictly business transaction. Avarice, their own cupidity, personal ill-feeling, and the cane farmers' unfortunate isolated position not infrequently prompted these people to offer 5s. or 6s. per ton of cane, the commercial value of which was 13s. and upwards. The farmers had to abandon cane cultivation, valuable machinery soon lay idle and was ultimately sold for little more than the value of old metal, and yet other mills were erected within a stone's throw of them, paying as much as 14s. per ton for cane, and have been very successful.

Although the people who wrought such ruin have long since ceased their connection with the industry, those engaged in it at the present time still suffer from the paralysing effects of their folly; for the cane farmers and plantation employees did not suffer patiently. They sought and found both revenge and relief. They knew from personal experience the planter's most vulnerable and vital point. They knew that he could not carry on his business without the aid of kanaka labour, and struck at that point; and they emphasised it by assuring Sir S. W. Griffith that they could and would undertake to grow cane without this class of labour if they could obtain the money to erect mills to crush their own cane. In due course the money was made available, and the mills were erected. The experiment proved, as you all know, a failure, and to no one did the failure cause less surprise than to the central mill farmers themselves.

Gentlemen, I have laid before you, perhaps for the first time, the true origin of the anti-kanaka labour movement.

Although myself a landlord, I was specially asked to bring to your notice the question of tenants' rights. I have seen many leases. I have been a tenant farmer myself, and except in my own case I never yet saw a lease in which the tenant had any rights except paying rent and taxes. The ordinary lease is one long list of pains and penalties. I presume what the tenant farmers really desire is relief from their wrongs, and these really do—especially in the sugar districts, not only in the interest of the farmers themselves, but of the districts and sugar industry also—call for immediate inquiry.

The short tenancies in vogue in the sugar districts—generally for five years—are having a most serious effect, not only upon agriculture and land settlement, but on what is infinitely more important still—domestic life. Several visiting delegates to the Mackay Conference remarked to myself upon the poor class of buildings occupied by the great majority of the cane farmers. I replied that this was the first and most visible effect of short tenancies, which compels the erection of only necessary buildings of a

poor and uncomfortable description. The tenant farmer is simply a sojourner, and it would scarcely be wise on his part to plant fruit trees which would just be coming into bearing when his tenancy expired, neither can he make his home as attractive to wife and children as he would wish. This state of things disheartens the husband, disgusts the wife, and drives the children to prefer the most precarious employment to agricultural pursuits, and it has an even yet more far-reaching effect on the children of well-to-do and prosperous farmers, who are very apt to form their opinions of agriculture as a calling from what they see of their less fortunate neighbours than from their own surroundings.

Doubtless a commission will be appointed to inquire into the sugar industry, and it is the cane farmers' bounden duty to use every effort to obtain direct representation thereon.

It will be said that agriculturists can no more be made prosperous than people can be made good by Act of Parliament. This, doubtless, is true as regards individuals, but not of communities. Is it the moral or the penal laws which impel society to observe the Sixth, Seventh, Eighth, Ninth, and Tenth Commandments? The Government which does not legislate favourably for the people who are on the land, and this is especially true of large and sparsely peopled countries, simply legislates them off it. Legislate the people on to the land, legislate for them favourably when they are on the land, educate them to go on the land, and last, but by no means least, try and afford the children of the people on the land a somewhat better education than at present. While large sums of money are spent on education for town and city boys, fitting them only for already congested and generally underpaid professions, or for that harbour of refuge, the Civil Service, country lads of fourteen years are being requested to leave provisional schools. I know the difficulties there are with provisional schools, which offer little attraction to teachers; but it should not be impossible to overcome them and greatly improve their usefulness.

Turning to the farmer himself, I think that it must be self-evident to all of them that they, as employers must use every effort to make farm labour more attractive and less drudging to the farm hands. Let us transfer as much as possible to machinery and animals work now done by manual labour. It is not an uncommon recommendation in the eyes of inventors that their separators or churns can be worked by a woman or young girl. Over thirty years ago, in Canada, I saw dogs and sheep doing the churning, horses and bulls cutting up firewood, pumping water, &c. Again, let me say that the farmers' wives and daughters in North Queensland, whatever their position may be, have more than enough to do in attending to domestic duties. I have worked alongside farmers' wives and daughters in Canada binding wheat. Machinery now does this. The climate of Canada, however, is bracing; that of Queensland, especially the North, is very enervating. Climatic conditions count for much in labour, whether performed by women or men, and our Northern climate is a peculiarly trying one.

Our conditions not only make it imperative that we shall make labour on the farm less abhorrent, but that we must economise it also. This can only be achieved by introducing up-to-date and labour-saving implements. But we must beware of false economy, which often wrecks farmers. It is not economy to plough land twice, instead of, as it may require, three or four times before planting, and trust to complete the cultivation after the crop is planted. The farmer's motto should be "Thorough in everything." Thorough cultivation and thorough drainage carry the farmer a long way on the road to success. I have often heard scientific farming and method in farming both highly eulogised, but if I were asked what I deem the greatest factor towards success in farming I should reply, "Forethought." Forethought tells me when I am cultivating a piece of land in the dry season that there is a period in our year when that land will have an abnormally large quantity of water to contend with, and prompts me to take measures to prevent any but the water which actually falls on its surface from passing over it. It also bids me remember that at another period of the year our rainfall is generally very light and irregular, and that I can in a great measure provide against this ill effect by conserving a supply of moisture to tide the crop over by deep and thorough cultivation. I experienced some surprise at the last Conference, when I urged deeper cultivation, to learn that it did not find favour with some who spoke on my paper. I am glad, however, that during the interim, some of them have changed their views. I may here say that I see that even in Spain, a country with a remarkably fertile soil (this may be due to the immense amount of British and French blood shed on it), but where, as a rule, agriculture is of a very primitive kind (and I speak from personal observation, for I lived for two years in one of its confines). In recent experiments made in ploughing for wheat at various dephths from 4 to 13 inches the yield increased as the ploughing deepened, the 13-inch land giving double the return obtained from the 4-inch ploughing.

FALL SUBSOILING A REMEDY FOR DROUGHT.

Land subsoiled in the fall of 1892 and planted to corn the next spring yielded 75 bushels per acre. Other land not subsoiled, but otherwise treated in identically the same manner, yielded about 35 bushels. In 1893 potatoes on the subsoiled soil produced 125 bushels per acre. The crop on unsubsoiled land was practically a failure. Last year rye yielded $30\frac{1}{3}$ bushels on subsoiled and on not subsoiled $2\frac{1}{2}$ bushels. Oats on corn ground one year from subsoiling $44\frac{1}{3}$ bushels, two years from subsoiling 39 bushels, not subsoiled 17 bushels. Last year the corn on subsoiled land made a vigorous, healthy growth. The stalks were large and tall; notwithstanding the fact that it had been planted entirely too thick, it yielded a little over 15 bushels of sound ears per acre. On land not treated, the stalks were not more than two-thirds as high, smaller, and the tassels were completely withered by the hot July winds. There was not a peck of corn on the entire field. We are convinced that if there is a fair amount of moisture in the soil hot winds are not necessarily fatal to the corn crop.

Our method is to first plough 8 inches deep with an ordinary 14-inch plough, following this with a subsoil plough running in the same furrow and loosening the soil to a depth of 8 inches more, but throwing none of it on the surface. This gives us a reservoir 16 inches deep to catch and retain all the moisture which falls, and we are convinced, during the twenty-three years we have resided in Fillmore Co., that there has never been a season when the rainfall was not sufficient to fill this reservoir before the growing season began. We harrow each evening all the land ploughed during the day. This breaks up the clods before they become hardened and prevents drying by evaporation. Before planting, we again harrow and pulverise the surface with a "float." Plant 3 or 4 inches deep, following the planter with a harrow. Practise shallow cultivation, running the cultivator just deep enough to drestroy weeds and break the surface soil. We cultivate the ground just as soon after a rain as the condition of the soil will permit. If the rain is a heavy one the soil is firmly packed. It is of the utmost importance that the crust be broken as soon as possible, in order to retain moisture in the soil, the loose upper layer acting as a mulch. We find that it is not necessary to subsoil each season; once every three years will answer all practical purposes. If the field is subsoiled and planted to corn the first or second year, then followed by oats or wheat, the results will be satisfactory, though a slight falling off will be noticed in the third crop after subsoiling.—Youngers and Co., Geneva, Nebraska.

Unfortunately, wrong impressions are often conveyed by using tillage and cultivation as synonymous terms. A writer will advise shallow cultivation, but were he interrogated you would find him a staunch advocate both of deep tillage and subsoiling, and that his advice only applied to cultivation after the crop was planted.

Unfortunately for those engaged in canegrowing in Queensland, their first acquaintance with agriculture was with virgin soil, which responded well to little or no cultivation or care, which gave colour for a time to the often-heard remark in the early days: "There is nothing in managing a sugar estate, anyone can do it; all you need do is to look over your neighbour's fence and do as he does." But they rarely looked over the fence of the man who had experience, or if they did it was only to denounce his methods as too costly or too slow. Cane planted in scrub land in a hole made by driving in a pick gave for a few years fair returns. The man who made good holes, however, followed cane-planting the longest. I know of an instance last year where two pieces of scrub land were planted with the same description of canes during the same week under the different systems alluded to; the difference in cost of planting was about 15s. per acre in favour of the pick work; the cost of after-cultivation was over £2 in favour of the holed piece. The yield from the former piece was about 5 tons; from the other, 27 tons per acre, and that in a very bad season.

I may say that I look upon drainage as the most important work in agriculture, and I know of no crop that so quickly shows signs of distress from stagnant water about its roots as does sugar-cane. I think, to get the best results from irrigation, it should be preceded by drainage or, at least, subsoiling. Did I contemplate irrigation, I should look to the profits from draining to provide the necessary funds, although in all probability it would make me fairly independent of irrigation.

The value of green manuring, as it is generally termed, is often questioned and instances given where there was no apparent benefit derived from the crop grown immediately after it over the crop grown on similar land without it. It may be there was no difference in the crops, but an analysis of the two soils would have given very different results after the crops were reaped. An application of 2 cwt. of sulphate of ammonia to the manured and unmanured plots would have given widely different results. In selecting a green crop for ploughing in, I think preference should be given to the deepest-rooting ones, which will draw on the subsoil as well as on the atmosphere.

"' As a general rule, the cane plants are not put in nearly deep enough, and, especially as regards spring planting, not covered deep enough either. Many planters like to see cane shoots above the ground in four or six days. I do not, and when planting in spring, of which I do as little as possible, I always cover deep. To be more particular, I give the land always four, generally five, ploughings. I instruct the ploughman to mark out 14 inches deep. This generally means 12 inches. The islanders then take cutlasses, put them well into the bottom of furrow, raise them a little, and puts the plants under. I then have from 6 to 7 inches more soil put on them. I do this to encourage root growth. The plants are some time before they appear above the ground, but they are strong and robust when they do so, and I know that there are plenty of roots then to support them.

Until infinitely more care is taken in the selection of plants, our canes must deteriorate, and as a consequence, become less reliable. As to the varieties of cane, soil, situation and, period of planting must all be taken into consideration. Canes which arrow freely should, as much as possible, be avoided for spring planting, for, as a rule, when there is a dry spring there follows a very wet summer. A probable lack of proper care also while young, owing to an insufficiency of labour, will tend to early arrowing, say by the end of April, leaving a nine months' cane whose whole existence has been a struggle with adverse conditions.

The farmer wants reliable money, reliable labour, and reliable advice; a reliable cane is of equal importance to him. In Mackay, fat, healthy cattle can any day be seen covered with ticks which do not seem to take any effect on them. Not so with the poor half-starved milker. Just so with canes; we find some varieties healthy and robust that nothing affects. Others, enfeebled by using plants which are quite unfit for propagating purposes, are prone to disease which the healthy canes would throw off. It is not the season which causes so many misses in April and May plantings. The misses and origin, deterioration and disease, are, to my mind, all to be sought and found here. Plants are often used which a planter would reject by the touch if blindfolded. The most casual observer must have noticed that few of our present varieties have either the bloom on the stalk or the health in the leaf that they had when first introduced.

I should advise, if it is not deemed impertinent, great caution in the matter of seedling canes. About all we really know of them is, that they are rich in saccharine matter. We know nothing of the soil in which they grew, or the conditions under which they were grown. We do, however, know this much—that the best of them are the offspring of the good old Bourbon which collapsed so suddenly in 1875. Even if these seedlings can be called new varieties, you will find that they resemble in many respects and to all appearance are closely related to old varieties long since almost abandoned, and you will find that, whatever excellence they may possess, they generally have all the characteristics of the variety they most resemble. I doubt very much if they exceed such varieties as the Malabar (not the variety now known by that name), Gingham (not the Mauritius variety), or the old Black Java in sugar content; yet these are now almost unknown to many canegrowers.

Some months ago a suggestion was made to the P.R.F.A. to try and induce the Government to send someone to other sugar-growing countries with a view to the introduction of new varieties of canes. At the time I opposed it. At the present time, were I the owner of a mill growing my own cane, I should not think of going outside the canes I already possess and have grown continuously for twenty-five years. But, were I interested in a central mill depending on farmers for its supply, I should suggest that that mill send a competent person to the West Indies and Guiana to thoroughly investigate the cane seedlings. Barbados planters abandoned the Bourbon for what is termed "the hasty and ill-considered substitution in that island of a heterogeneous mixture of untried varieties," and I think they have had deep cause to regret it. It would perhaps be well worth the while of the Government to undertake this work, coupling with it a tour through the United States to observe machinery, methods of cultivation of ordinary farm crops, harvesting of same and returns.

Early trashing tends greatly to the health and vigour of the crop, as leaves are removed which would otherwise become a harbour for and breeding places of pests and parasites. The removal of the dead leaves would also, by admitting light and heat, cause canes to come to maturity which otherwise would never do so. If trash, when removed, instead of being allowed to remain where it falls, were all placed on one bank, leaving every alternate bank or space between the cane rows quite clear, it would enable the cutters to do their work much better and much quicker, and would also have a very beneficial effect on heavy crops when they go down, by keeping them from coming in contact with the soil, which causes them to grow at the eyes. This has

a serious effect on the yield of sugar. It would also admit of free circulation of air and light during the whole period of growth.

The burning of trash I have been condemning for the past thirty years. Most of us know that it represents fully 50 per cent. at least of what the cane plant takes from the soil. We are also told that fire frees nitrogen from the soil. It also has a most injurious effect on our generally badly cut cane stools, but, much as I think this foolish practice has had to do with diminishing the fertility of our canefields, I believe the irriational practice of hilling up cane has done infinitely more in that direction. Let anyone look at one of our corrugated canefields after a heavy fall of rain, and what will they see? Water furrows washed out to the pure impervious clay, or else containing a deposit of pure sand; the corrugations are one mass of fibrous roots exposed to sun and air from which they do not obtain any nourishment. The proper way to get rid of the surplus water is by underground drains. I have read that by this system, certain valuable constituents of plant food are carried off by the water. Minute experiments have shown this loss to be very small indeed. No one watching surplus water, almost of the consistency of mud, running off a canefield along the water furrows needs the aid of the chemist to tell him that the fertility of that field is being diminished to an alarming extent.

Most of my agreements with my tenants are verbal. Should I at any future time enter into agreement by lease, one extra clause that I shall have inserted, and which I shall enforce even more rigorously than the payment of rent, will be that there will be no corrugating of the land.

In other canegrowing countries, where good cane cutting is always enforced, the cane stools are always trimmed when cultivating and supplying the cane row. Pointing this out to the Homebush farmers, and urging them to introduce what is known as a stubble shaver, some of them mentioned that they had noticed that the ratoons were much stronger where the cane row had been levelled for laying moveable trams. As long as fields are corrugated and the cane stools are on the crowns, with ratoons growing on the surface and often above it, payable ratoons crops need not be expected. That a certain system of what is called ratooning has been followed for years, gives it no claim to respect, especially when judged by results; nor does the fact that the common plough is generally used and held in high esteem by most ploughmen afford sufficient reason why both system and implement should not give place to improved methods and machinery. Fifty years ago sickle and scythe were, and had from time immemorial, been universally used. To-day few farm hands can use either. I do not think a machine will ever be invented which will cut even in a rough fashion a payable crop of cane, but I do not think it should be a hard task for some mechanical genius to invent an infinitely better implement than the plough to be used between cane rows. Personally, I never put a plough into my land when once planted with cane. I have often grown three good crops in succession on forest land without the aid of the plough.

It just occurs to my mind—it should have done so earlier—that I am not writing a book to be read at leisure, but a paper for a Conference the time for getting through the business of which is much too limited; still I must crave your patience a little longer; and I do so on the ground that I have a little more to say, and that this is the last Conference I shall attend, at least as a delegate.

In a recent American paper I read a statement made by an American Senator to an assembly of farmers. He said, "The farmer has no friends and he deserves none." It was the common want of unanimity among them, and their almost chronic lethargy, even when their interests are imperilled, that drew from him this taunt.

"The Farmer as a Politician" was the title of one of the papers read at the Warwick Conference, and it is a subject which demands much more serious thought than is given to it. There is almost a universal prejudice against the farmer as a legislator, yet, not only as a politician, but as a statesman, the intelligent farmer has no peer, for, even while following his calling, his mind is clear and unoccupied, and he can reason out his ideas; not so the bulk of our legislators, who are business men, brain-workers whose minds are, and always must be, solely given to their business if they are to be successful. To this, rather than that there are too many lawyers in Parliament, are due the asinine peculiarities of many of our legislative enactments. Some of our legislators, when dealing with agricultural interests, speak and act and legislate for farmers as if they followed agricultural pursuits solely for pleasure or from purely philanthropic motives, instead as a means of livelihood. I trust that the farmers will use every effort to obtain their fair share of direct representation by men of their own class in Parliament, that they will aspire to be something more than mere purveyors for the parasites, that they will take a hand in framing the laws of the State and shaping its destiny, and that ere long it will be self-evident that Queensland farmers have many true friends in Parliament.

In conclusion, let me urge you to be unceasing and untiring in your efforts to elevate both agriculture and the agriculturist, and to secure to both the respect to which they are entitled.

Some of my suggestions may mean a somewhat larger expenditure on the part of the Government, but there are two sides to every ledger, and ultimately it may be proved that a small extra expense on account of agriculture has saved a very much larger one in another direction. Australia is now a nation, young and sensitive. Her actions will be watched by foreign powers, especially those with possessions in the South Pacific, with much keener concern than formerly. There is already some talk of applying the Monroe doctrine. Not long since a French statesman referred to what he fondly styled "the unappropriated parts of the Continent of Australia." It is said that the best way to avert war is by being prepared for it. There is no better man behind a gun than the man from behind the plough. Foster agriculture, and then if war breaks out, there will be no long delay nor great cost in mobilising our defenders. Let the bugle sound the alarm, and thousands of stout-hearted and strong-limbed country youngsters will promptly respond, needing only sufficient time to kiss their own mothers and somone else's sister, seize a true rifle and mount a trusty horse, and present themselves fully equipped at the nearest rendezvous, an army which friends can trust and foes may dread, and, if our army is a small one—

> The world knows well to-day
> That a small Australian army goes a darned long way.

The next contribution was by Mr. E. Swayne, of Homebush, Mackay :—

SOME PHASES OF THE SUGAR INDUSTRY.

Mr. Chairman,—Having been since yesterday morning asked to substitute for the paper on "Associated Action amongst Farmers," for which I am down on your programme, another dealing with one or two of the questions that are just now exercising the minds of all connected with the sugar industry, and to one of which great, and I think undue, prominence has been given in recent politics.

Owing to the time I have had to prepare it, you will, I must ask you to, excuse me, gentlemen, if it is somewhat crude. In it I will touch on the labour difficulty chiefly from a climatic point of view; and the organisation of an industry which from the distance the districts in which it is principally carried on are from the large centres of population, and the consequent unavoidable isolation, comparatively speaking, of those engaged in it, particularly requires that they shall act with unanimity.

If the industry could have existed without such labour, kanakas would have gone years ago with the advent of the small cane farmer, for I can safely say that the great majority of that class first took their farms with the fixed determination of doing the work entirely with white labour. It was only after a hard struggle that they were reluctantly compelled to admit that a power greater than that of man prevented them.

The utter unreliability of white labourers in the tropics, which is often adduced as the cause why the industry cannot be successfully prosecuted, if dependent entirely upon them, is wrongly so termed—it is simply the effect of a cause, the primary reason being the natural repugnance of the men to work under conditions to which they are not constitutionally adapted. Many of the same men who in the Northern canefields are a constant source of anxiety and loss to their employers—through their habit of knocking off work on the slightest pretext, getting on the spree, falling sick, or clearing out of the district just at the time their services are most required—would, on a Southern farm, work contentedly enough. But they were not intended by nature to work in a moist, sweltering heat surrounded by tropical vegetation higher than their heads, the work itself generally requiring to be performed in a stooping position. That the climate of tropical Queensland is a trying one to Europeans, requires only a trip from Melbourne to one of the Northern ports, or *vice versâ*, for the difference in the physique of the people to be at once seen. The fresh condition of the South is replaced by sallow or pale faces, nor will the same robust frames be seen. A tendency to smaller chest measurements will be apparent, and a general air of listlessness will be noticed. Such being the case, is it to be wondered at that a man's nature revolts at performing year in and year out, for long hours every day, the drudgery entailed by some of the work necessary on a cane farm. If sugar-growing as a large industry is to succeed, farmers cannot be expected to go to the expense of planting cane (a crop that requires constant attention) and then depend upon the chance of sufficient unemployed coming along to enable them every few months to replace those who get tired of their job and chuck it, for a week or two without labour at a critical time means an irreparable injury to the crop. To carry on canegrowing to such an extent as will utilise the

Commonwealth's vast resources in those regions where only tropical products flourish will require a fixed population capable of hard manual work, for it must be remembered that, so far, it has been found impossible to employ machinery to anything like the same extent in the canefields as prevails in other branches of agriculture. It is sometimes asserted that higher wages will overcome the difficulty—in other words, money is to be pitted against nature. This raises two questions—first, is it desirable or is it for the good of the community that men should be bribed by a few extra pounds to injure their constitutions, and if this is assented to would it meet the difficulty? So far, experience has shown that, generally speaking, the higher the wages the less the work done. The more money, the longer the time taken to spend it—in other words, the bigger the spree. In reply to this it has been asserted that with higher rates a better class of men will flock to the sugar districts, but the same dislike to some kinds of work would still be shown, and in the past there have been many instances of steady men in receipt of good wages for field work during the cooler parts of the year directly the hot weather has commenced, when the most important work in the routine of sugar production is at its height, declaring the country was not fit to live in, and leaving it for pleasanter climes.

Coming to the facts bearing on the question as to whether the climate of the majority of the Queensland sugar districts is really one that is suitable for white men to be engaged in field work: The future development of the industry will take place in the districts situated on the coast, commencing at Mackay and terminating at Cooktown. Taking Cairns as the centre of the locality where the largest extent of rich new lands lies, the mean maximum temperature there for the four years ending 1897 was 83·3, the mean minimum 67·6. As Cairns is directly on the coast and gets the benefit of the sea breeze, and as the canegrowing lands are very often hemmed in by mountains where the breeze cannot penetrate—in fact, regular steaming pans in which cane luxuriates—the Cairns readings are rather temperate for those parts; but it is when the column indicating the humidity of the air is glanced at, standing as it does at 73·1 with an average rainfall of 90 inches, that the climate is fairly realised. What must constant hard work under such conditions take out of a man? Compare it with other countries where sugar-cane is the staple. Honolulu has about the same maximum, Java only 5 degrees higher, yet what sane man would talk of growing sugar there, if compelled to rely for his labour entirely on Europeans. In fact, some Southerners coolly ask us to attempt a task never yet accomplished in the world—the carrying on of a large agricultural industry in these or corresponding latitudes close to sea level exclusively with white men as labourers. As it is, the Queensland sugar producer employs more men of his own race than any other cane sugar producers in the world, and Australia should be proud of them for doing so. As for protective duties being a panacea for the trouble, Hawaii has the advantage in her markets, United States of America, of a 40 per cent. duty, and yet they have the same anxiety over their labour as we have. And now I would like to quote a few actual experiences that have occurred to those who have tried to entirely replace black labour with white. Of course, Sir Samuel Griffith's legislative experiment of about ten years ago is too well known to require going into; suffice to say, £50,000 of the State's money was put into it, and an honest attempt was made by the growers to carry it to a successful issue. Coming to individual efforts: At Mackay, in 1891, the Colonial Sugar Refinery Company commenced the subdivision of their Homebush estate into small farms, the leases of which were chiefly taken by men who, as ploughmen, &c., were well used to agricultural work, both in Europe and out here, being thoroughly practical men. Most of them started firmly resolved to have no blacks about the place. For the first year or two, on open forest land, exceptionally well adapted for the use of horse implements, several of them, with the assistance of their children working in the field when they ought to have been in school, and sometimes of their wives, to the detriment of the latter's health, they managed to adhere to their resolve, but as the harvest time came along extra labour was an absolute necessity, and the gang of white canecutters was put on at contract, the rate being 3s. 6d. per ton, horses and drivers being supplied for pulling the cane trucks on the portable tram lines. The crop throughout was fairly good, but there was constant difficulty in men knocking off, sometimes a strike of the lot, only ended by some concession by the employer, and considerable delay through drinking when money was paid. Again, the next year, 1895, a gang was picked of a thoroughly good stamp of men, and, profiting by past experience, an agreement was drawn up and signed that it was thought would prevent all difficulties. The rates were 3s. per ton for all crops over 15 tons per acre, 3s. 6d. for under 15 and over 10, and 4s. for under 10 and over 7; below that, day wages (the crops were poor this year), men providing their own food. Camp equipage, and cane knives, and a horse to pull trucks were supplied by the employers. At the end of the

first week all struck but three, saying that the pay was not enough. After some delay, the gang was again made up to its original strength of twelve, principally by the addition of local men, ploughmen, and others taken from their regular occupations. Even after this there was frequent trouble, strikes more than once only being averted by concessions not contained in the original agreement, as well as disagreements among the men. In spite of the many delays so occasioned, every man in the gang at the expiration of the season had cleared over all expenses 25s. per week for the whole time, and some, who joined when the gang was in good cane, £2. Yet it was clearly impossible to depend on such men to keep a large mill going, one that required 400 to 500 tons of cane every day and a constant, even supply, loss on the one hand accruing if any stoppage through a short supply of the raw material occurred, while on the other the perishable character of the sugar-cane precluded any reserve being stored against contingencies. Again, a cane inspector in the Mackay districts, in his 1896 report to his principal, says there had been considerable trouble with European canecutters. At the start as many as 40 men were engaged within a few weeks to maintain one gang of 13 up to its strength. Eventually this gang had to be disbanded and replaced by Chinese. Only two gangs (or about 25 or 30 men out of the 250 or 300 required to keep this mill going) worked throughout the season; these averaged 25s. 6d. per week, including stoppages, after paying for rations. It must be borne in mind that, in the Mackay district, the climate is not so severe as further north, and the work was on flat land, where for the tropics, no more favourable conditions for white men to work under could be found (in some places the canefields are on the side of steep hills where it is impossible for a white man with his boots on to carry a load of cane like the barefooted islander), also that at that time referred to, there were no mining rushes, railways, or other public works to make labour scarce.

In reference to the opinion often glibly expressed by men who themselves have never done a day's work in the canefield—that the solution of the difficulty is in the working of canefields by the farmer's own family—to hear them talk, one would think that such would be a happy arcadian sort of life for the canegrower. But what it really means is this: That a man until he could labour no longer would be tied to work in his canefield in a climate where old age comes on fast. It means that his children, if not his wife, as soon as able to wield hoe or cane knife, or pull the dry trash off the cane stalks, would have to take to the drudgery of the canefields—a drudgery that occurs with no other of our staple crops. It means that their opportunities for education would be scant—in fact, as a canegrower's children would of necessity be compelled to work at the same calling as their father, it means the introduction in our midst of the old caste system in India: a blacksmith's or a carpenter's family do not have to earn the family living at the forge or bench. Then why should the farmers? And it also means that no one who could earn his living in any other way would take to canegrowing; and that everyone who could, would get out of it.

The other great question connected with the industry is that of its organisation. The arguments we have heard during this Conference in favour of forming a Chamber of Agriculture—and they were so strong that there was no gainsaying them, and I, for one, would willingly stay after this Conference has terminated for the purpose of assisting to set that movement on foot—apply with tenfold force to the sugar producers. Under this heading I include both canegrowers and the makers of raw sugars. Before going any further, Mr. Chairman, I should like to remark that the fact of the sugar men forming an alliance for the advancement of their special interests can in no possible way militate against the formation of the chamber—in fact, rather assist it; the same men can be members of both, or the firstnamed could, on behalf of the latter, have special charge of the sugar section of the many branches of agriculture it will represent. I have already shown that we labour under special climatic disabilities, and to them I may add the misfortune of having to compete with a rival State subsidised by the most powerful of European nations. If, through want of a little organisation on our part, we fail to place before the people in a concrete form the conditions rendered necessary by our unique position, we are guilty of a serious breach of trust, for we hold in keeping for them one of the greatest of the federal assets, the prosperity of the rich tropical lands situated on Australia's north-east coast; and we certainly owe to them that we should be able to inform them in a fairly unanimous manner as to the best methods for their development. If, after this, harm is done, then most certainly we shall not be to blame for it.

As far as district organisation goes, in Mackay, Cairns, Bundaberg, the Herbert, Burdekin, and Proserpine, growers' associations exist. In the former, the Pioneer River Farmers' Association has, for nine years, enabled the farmers to take united action. Under its management the great difficulty of distance apart has to a considerable degree been overcome by rules that allow seven or more farmers to form one

of its branches. Some of these branches number seventy members, and are to be found working in nearly every little farming centre. They meet once a month, and on a membership basis are represented on a central council meeting in Mackay every two months; in fact, a miniature Chamber of Agriculture. Through this body, good work has already been done—such as improvement in the labour conditions, steps for the eradication of insect pests, the promoting of instructive meetings between the experts of the Department, and last year a Conference, convened without any assistance from the State, on which most of the sugar districts in Queensland were represented either by proxy or personally (Mr. Cran coming from Bundaberg) was held. At it the constitution for the proposed sugar union was drafted. A recommendation was made that afterwards bore fruit in the appointment of Dr. Maxwell, and for the first time steps were taken to officially record a combined opinion on the labour question. Although it may seem irrelevant to mention such things in a paper on the sugar industry, in other matters besides those exclusively pertaining to it the farmers have benefited by its work. A method for the co-operative purchase of their supplies has been arranged that on an average has effected a considerable saving to every farmer in the district. I am very pleased to hear that the Logan Association have successfully arranged co-operative methods for the disposal of their products. Our shows have been kept under the management of the farmers, and with some success as is shown by the fact that, with a prize list of over £300 per annum in value, the amount resulting from two shows now lying to the credit of our show account is some £350. In this matter the townspeople have cordially assisted. We even had the audacity to take part as a body in politics in '93, Mr. Chataway, on his advent to public life, being our endorsed candidate.

But, coming back to the subject-matter of my paper, whatever isolated action on behalf of the industry may have done in the past with our interests centreing in Brisbane, it is but a natural consequence of federation that, with the partial transfer of their control to the extreme south-eastern corner of the continent, some more powerful body for the furtherance of our interests is requisite. The constitution of such a body was drafted at the sugar conference held in Mackay last year, previously alluded to. Under it, without in any way forfeiting their freedom or prejudicing their case in such matters as the price of cane, &c., the grower can meet the miller and work with him unitedly on the many subjects on which their interests are one, such as tariff duties and so on. Statistics relative to the industry can be collected, and, if our request for the appointment of a Royal commission is granted, such a body as proposed will be of great service. At any rate, it must be obvious to both sections that on these and the many other questions in which their aims are one, each will be an access of strength to the other. The whole thing is based on that principle of unity which is acknowledged by all to be the first stepping-stone towards our advancement.

DISCUSSION.

Mr. F. W. PEEK (Loganholme) : Last year, at Warwick, the sugar men had a chance of dealing with wheat and pigs, and now we have in Bundaberg here a chance of dealing with sugar. I generally like to speak pretty straight, and I would now like to place before you a few figures, which I collected this afternoon from the Hon. Angus Gibson, which should be noted, as they contain a subject of vast importance to us Southern men. It was information I was there to gather, but unfortunately, there being so much else to see, it was information that could not be participated in by everybody. But I am in a position to be able to record figures given to me, and I shall now take pleasure in presenting a few of them. In the eliciting of facts, which we come here to collect, I found out to-day, at Bingera, that on the plantation owned by Messrs. Gibson and Howes there were employed 350 "boys"; that those boys are subsidiary to the employment of 140 whites; that there are 35 families residing on the estate; that that estate not only provides work, but provides education and religious instruction. They have a Sunday school on that estate, although we are often told the kanaka is degraded and looked upon as a slave. In that Sunday school not less than 70 attend regularly. They have a hospital on that estate in which anyone who is sick is carefully attended to, the same treatment being meted out to both blacks and whites. On Bingera not less than 100 horses are employed, and those 100 horses consume maize grown in the South of Queensland. The amount of maize used per week is not less than 42 bags. We were likewise taken to the bakery and cooks' shops, and I found that not less than 3 tons of sweet potatoes were

used every week, all of which were purchased from the Caboolture district. I likewise found that the estate employs no less than 10 cooks and 2 bakers. Those 10 cooks and 2 bakers use no less than 600 loaves of bread of the best quality, made from Warwick flour. There are 14 bullocks cut up and used every week to feed those boys and employees. Then there are 42 miles of private railway on the estate, six locomotives, and 500 trucks for carting the cane to the mill. Further, the firm have another property 20 miles away, at Watawa, from whence the cane has to be transported to Bingera over the Government railway, and Messrs. Gibson and Howes must, therefore, be contributing a not inconsiderable income to the Government in freights. I would like to draw attention to a statement which I read in the *Brisbane Courier* a few short days ago, in the Southern House of Representatives, that a white woman could not and dare not walk through the streets of Bundaberg. I would like to give from this platform, after having been here a week, that statement an unqualified denial. We have passed a splendid resolution this evening, which I hope may have some influence with the Federal Parliament, for I think the sugar people of the North deserve the earnest support not only of every farmer, but of the whole of Australia.

Mr. T. E. Coulson (Rosewood): This sugar business is a very large subject, and I may say I had my eyes opened this afternoon by the magnitude of the industry. I can easily see that it requires a lot of capital to work such an industry as we see here to-day, and that, if that capital is used to provide food and work for us people, then people who are using it are good colonists. I may here state that I am very thankful to Mr. Gibson for giving us the invitation to Bingera, and for treating us in the way that he did when we got there. We have heard that cane cannot be grown in this country without black labour. I have my opinions about that. I know nothing about your conditions here, but there is a sugar-mill in the district I come from, and the small farmers are growing cane for it, under a cast-iron agreement, at 6s. 9d. per ton. Now, some of those farmers have to cart their cane 3 and 4 miles, and some as much as 5 miles, over rough and ridgy country.

A Voice: Are they making a living?

Mr. Coulson: That is the question. They are not making such a living as they would like. It pays some so well that they prefer to pay the penalty provided by the agreement for not growing cane rather that grow any at all and get 6s. 9d. a ton for it. If, however, they had the facilities I understand they have up North in the shape of access to mills, &c., and got 10s. a ton for it, I think they would make it pay. There is another aspect of the question I would like to speak upon. Mr. Swayne has read a very able paper, and he says that no white man can work in the canefields in the Northern portion of the State. I therefore suppose if we want to be gentlemen, we must be Northern cane farmers. I presume they do not stop inside all the time. Now, with regard to reliable labour, I must say that I never hear of strikes among the Northern engine-drivers, so I think it must be a matter of pounds, shillings, and pence. Where money is to be made, you will always find white men ready to make it.

Mr. T. Burgess (Forest Hill): I came up to Bundaberg at the end of last week for the purpose of getting some information relative to the employment of black labour on the sugar plantations. I used to hold a conviction that this black labour business was a matter of pounds, shillings, and pence, and that if white men were properly paid there would be found enough of them willing to do the work required on sugar plantations. I have been in a position to acquire some valuable facts, and something has altered my views very considerably. Eight years ago there left our district about twenty men. I knew most of them personally, and knew the stuff they were made of. They were men of grit, energy, and intelligence. They came to Bundaberg, and the morning they left Laidley, I came down to Brisbane to see them off. Those men went to Bundaberg determined to grow sugar, and to grow it without black labour. These men assured me they would do so. I came to Bundaberg last Saturday, and went out to Watawa, where

these men now are, and spent two days amongst them. I talked with them, and reminded them of what they had said in the railway carriage coming to Brisbane eight years before. I asked them how it had panned out, and they went into the details of the matter with me. There were no two opinions among them, and while they admitted that white men could do the work in Bundaberg (they were not talking about further North), still they would not do it. They say, "Take away the boys, and you can take away the farms; we cannot grow sugar without black labour, and we will not try." You may take this for what it is worth, but these are white men, reliable men, Englishmen, men whose word you can take, and that is their verdict after seven and a-half years' trial. People are always coming down South and telling us there are a lot of Simon Legrees on the plantations, and that such were the class of men who employed kanaka labour. What I have seen in Bundaberg and the class of men I have recognised employing kanaka labour give that thing the lie. We have a class of men in Bundaberg of a high social standing, men who would not ill-treat a kanaka any more than they would ill-treat their own wives. I have heard members of Parliament say that the kanaka introduces leprosy, and that they set a moral example that was degrading to the men who employed them. I saw a church at Currajong Creek totally built by kanaka money, and I heard it on the best authority that 300 boys gather there every Sunday. Further than this, I am assured that a lot of these boys set an example that might well be copied by white men. I can see that the kanaka question in the hands of such men as the Gibson Brothers is in safe hands, and that it cannot be in any way dangerous to the moral health of the community.

Mr. H. HEINEMANN (Mount Cotton): I feel it my duty, as I have been a canegrower for this last twenty years, to state, although I have no personal interest in the matter whatever except for the welfare of Queensland at large, that I consider it absolutely necessary to retain the Pacific Islanders. It is not that they are cheap, but reliable labourers. I certainly think if we are not permitted to retain the concession of being allowed to use the islanders, the result will be the downfall of the sugar industry. White labour, in its present state in Queensland, is altogether too unreliable for the conditions of the sugar industry.

Mr. G. R. MAYERS (Cairns): I would like to give you a little idea of the way the sugar industry is being carried on in Cairns. The delegates to-day had an object lesson in the splendid show seen at Bingera, but we in the North have also made great progress during the past six years. It is a little over six years since the Sugar Works Guarantee Act was passed. Six years ago there was situated about 14 miles from Cairns a strip of land on either side of the Mulgrave River, in the possession of some six settlers. They had a few head of cattle, and there were also a few Chinamen growing a little maize. Between that time and now we have erected a central mill on one bank of the river. On the other there is a large estate called the Aloomba Estate, which is laid out for farms, and originally intended to have a central mill also. At the present time, however, the cane is going to another mill which was established previously. We have built the Cairns-Mulgrave tramway, and that tramway extends into 16 miles of very rich country. It has paid its way from its construction, including both interest and redemption. The Mulgrave Mill is in a very good position financially, and we have paid all our interest, and redemption money also, except £400, which would have been paid, too, but for a mistake, to the 30th of June. We have now a settlement of about 150 farmers. A township has sprung up on the Mulgrave River, besides several smaller villages. We have a settled white population of between 300 and 400 persons. All this has been brought about through the help we got from the South Sea Islanders. If anything is done to stop this labour, I am afraid that land will go back to the condition it was in seven years ago, when its whole white population consisted of the families of half-a-dozen settlers. I do not think Mr. Coulson has had much experience of the Northern climate. I have been ten years in Cairns, and yet if I got a good chance to-morrow I would not have much

hesitation in leaving it. I spent about nine years about Barcaldine and Cloncurry, and I can assure you I would rather work there with a temperature at from 120 to 127 degrees than I would work in the Cairns climate when the glass is 96. Even this last season we had about thirty draught horses dying within a few days, which simply was due to the excessive humidity of the atmosphere. If it is so hard upon them, what must it be for a white man? I have had men working for me, and there were times when it was impossible to work either the men or the horses. I had good men, but had the weather been more favourable one man could have done what three of those men did. When we first started at the Mulgrave we had all sorts of labour. Some had whites, but the most whatever they could get. The first year it cost most of those settlers from 4s. 6d. to 5s. 6d. per ton to cut their cane. I myself cut things just as fine as any of them, and the first year I was £1,400 to the bad. It is only since we got good and reliable labour that we have made up anything like leeway. This is not only a question for ourselves, but also a question of whether any more of these lands are to be opened up. We have 75,000 more acres available and fit for cane, and I believe that on the Johnston, the Bloomfield, and Mosman there are similar areas awaiting the pioneer's axe. Another fact is that since we have been growing cane, the imports into Cairns from the South have increased considerably, and we take a good deal of our supplies from Southern Queensland. Nearly all our potatoes and butter come from the South. If there were three or four more central mills erected in the far North, the Southern people would soon know all about it and feel the benefit just as much as we would.

Mr. J. WILSON (Freestone Creek): I came here largely to pick up information, and have not disdained to get some of it from the islanders themselves, with the result that I have found that they, at least, seem perfectly satisfied with the treatment accorded to them by the planters of Queensland. As for the necessity of this Polynesian labour, I know that when we grew wheat without machinery we could never rely on sufficient white labour to sow and harvest our crops, and I do not quite see how the sugar industry could keep white men idle for half a year in order to have them available during the other half. Wheat-growers have now got over that difficulty through the introduction of machinery, but mechanical invention does not yet appear to have come to the assistance of the canegrower, and, until that is done, it would seem that a more reliable and larger source of labour than our present white population is able to furnish, are necessary for the maintenance of the sugar industry in Queensland.

Mr. J. SCANLAN (Helidon): I am not an opponent of kanaka labour, because I believe it is necessary. In every tropical country of the world coloured labour is used. But I stand here to strongly object against the introduction of Japanese labour, for although most of the talk at present is about kanaka labour, yet the danger of it is infinitesimal as compared with that of the possible unrestricted introduction into the State, of Japanese and other Eastern races.

Mr. J. DAVIES (Rockhampton): Allow me first of all to thank the Messrs. Gibson Bros. and their partner, Mr. Howes, for the very kind welcome they tendered the delegates to-day. I may say that many of us were in great doubts about this kanaka labour when we arrived here on Saturday. We were wondering whether it should be abolished altogether or gradually. But I should say that all of us, after having seen the great outlay at Bingera, are now of the opinion that it should not be abolished at all, and that we should keep it for all time. I can assure the planters, on behalf of the delegates from the Central district, that we will give them all the assistance in our power to enable them to retain the labour.

Mr. E. SWAYNE (Mackay): With regard to the figures afforded by the sugar industry, I may say, as a supplement to Mr. Peek's remarks, that in one year, 1,600 tons of maize, 350 tons of potatoes and chaff were used in the Mackay district from South Queensland ports, and that does not include imports from New South Wales. I think an industry which affords such a market as

that is worth keeping up. With regard to the climatic question, I have been eighteen or nineteen years in the North, and it is my opinion that any man who works for a number of years long hours in the canefield will injure his constitution. I do not think it would be wise policy to compel white men to do such work. I may safely say that the Northern planters do not want Asiatics, and I think that point may be made quite clear. We only want the Polynesian. With regard to the temperature question: It is not the temperature readings only that you must take, for it is the humidity that makes the difference. On the Herbert River they have already had 130 inches of rain this year. Work has had to be done during that time, and I do not think anybody could work in such a climate without doing himself an injury.

The next paper was entitled—

THE NECESSITY OF A STATE SUGAR REFINERY.

[By E. ROBERT, of Cairns.]

During the last ten years our Government, with great wisdom, gave the sugar-growing districts every opportunity of accepting the assistance of the State in establishing central mills under the Sugar Works Guarantee Act. It goes without saying that we cane-farmers put our shoulders to the wheel and worked energetically, and gave all we were worth as security for the State's assistance; and I need not tell you that we, full of hopes, pictured to ourselves great success. But I am sorry to say that before many years had passed, we realised the hard fact that it was not indeed altogether a bed of roses we were preparing for ourselves; or, to put the matter in the most favourable shape, we realised that if the bed was to be of roses, those roses had hard and long thorns, which we must either avoid or eradicate. Those thorns have sprung on us unawares, and are of rather recent origin, as political agitations, financial disturbances, and labour complications, in the shape of bounties, tariffs, bad seasons, grubs, and now a threat by our Federal Parliament to take away the small amount of reliable labour in the shape of the kanaka before such time as we may be in a position to be able to carry on the sugar industry, so that we could meet in time the threatened action of our Federal Government.

Thanks to that great political squib of a white Australia, the Southern States have partly been shown our true position, and they now see that the sugar industry in the North needs the greatest care to save it; and now we have amalgamated, it is the duty of each State to study and safeguard the interests of the other, and they themselves would be very black indeed in attempting to massacre the baby State in the building up of its great sugar industry, which I am not afraid of. You will admit with me, gentlemen, that the cane-farmer left no stone unturned to combat the above difficulties by improving the culture, introducing new and costly manures, adopting improved machinery, and, lastly, by calling in the services of a great expert.

By all these means the tonnage per acre has been increased, and yet we cane-farmers find that the limit for profit is very narrow, and very often even dubious. There must be a screw loose in the machinery.

Gentlemen, it is more than a loose screw—it is, in fact, the absence of the superstructure and the cap of the edifice that makes the whole affair leaky and uncomfortable. This superstructure in the sugar industry is nothing less than a State refinery to be added to the State mills, because a refinery is part and parcel of a central mill, and it would enrich the farmer as well as the State; it would enable the farmers' production to be placed in the market at cost price, so that they could reap the profits of their labour; it would complete the work that the mills at present are unable to accomplish. First of all we must take into consideration the position of the Government and the farmer. The Government has advanced over half a million of money for the establishing of central mills, and the farmers have given in return, as security, the deeds of their landed property to the Government for that amount of money.

Now, as the Government and the farmer are so closely connected with one another in the sugar industry, to a certain extent they become partners—that is to say, the Government are in duty bound to assist as much as possible, the farmers to meet their responsibilities when they fall due; and it is the farmers' duty to do their utmost, and acquaint the Government with anything they find out through experience that would be to their advancement, and also to the advancement of the State.

We have now twelve central mills. These are enough to warrant the establishment of a State refinery.

Now we have to see how it will pan out, and to show clearly that it will be good for the farmer, and that it will create a big prosperity to the State.

The first is the refinery. Say that it will cost £100,000. Now, twelve into £100,000 will be £8,000 per mill, say, to be paid up in eight years. With interest and redemption that will be about £1,200 per year per mill. Take it as a standard that each mill turns out 5,000 tons of sugar per year.

Now I will take the Mulgrave mill. The farmers receive 12s. 6d. per ton for their cane, and it costs the mill, to turn out their raw sugar, £9 9s. per ton of sugar.

Now, their 5,000 tons of raw sugar, at £9 9s. per ton, is £47,250, interest and redemption on refinery. About £1,200 brings it up to £48,450; the cost of refining per ton of sugar, say, £1 10s., brings it up to £55,950; transmission from the mill to refinery will be in Brisbane, say, £1 per ton, that brings the total to £60,950.

We demand the market price, say, at £16 per ton; that would be for the 5,000 tons of refined sugar, £80,000. Deduct the above £60,950, the cost of milling and refining, and it leaves a balance of £19,050 net profit; that is, about £3 16s. per ton profit.

The average to make a ton of refined sugar is, say, 10 tons of cane, so that the net profit of £3 16s. per ton of refined sugar would represent to the canegrower an extra value of about 7s. 7¼d. per ton of cane, which being added to the 12s. 6d. which he has already received, would give a total price of £1 0s. 1¼d. per ton of cane. These figures clearly show that by attaching a State refinery to the operations of our State central mills, the growers would receive the full value of their crops, which enormous loss must now keep them poor and render them unable to meet their engagements to the Government, and the same enormous loss of the farmer becomes the extraordinary profit of the two existing private refineries.

I wish to draw your attention to the full benefit. Not only would we receive nearly double what we are already receiving, but at the same time we are paying off the cost of the refinery, and in eight years it becomes our property. Then redemption and interest having ceased, the grower would receive so much more.

I hope you gentlemen at this Conference will see the necessity of a State refinery, and place the farmer in a position to render him able to discharge his liability to the Government.

It is only the refinery that will save the sugar industry in the North; if it is not established, the industry will be bled to death for the benefit of private refineries.

Mr. Chairman and gentlemen, I think I have clearly demonstrated by figures the advantage that the farmer would receive by the establishment of a State refinery. No industry can possibly stand such a tremendous draw on its vitality, and it explains the agonising struggles of us canegrowers, which really are all in a nutshell, and which will all be removed by at once establishing a State refinery.

Now that I have struck the keynote let us agitate until a State refinery is an accomplished fact.

DISCUSSION.

Mr. E. NEWITT (Birthamba): It seems a large matter to ask the Government to establish a State refinery, although for my part I am very much in favour of a State refinery on behalf of the canegrowers of Bundaberg. That is what we have need of. But there is no necessity for calamity-howling in the matter. There is a man on the Mary River who is getting his 300 tons of sugar-cane off 9 acres of land, and for this he receives 10s. a ton from the refinery that is already established there. What is more, he earns his own food off that land and does all the work himself. With regard to what has been said on the labour question, I may tell this audience that my poor old mother was able to grow cane in the Bundaberg district with success.

Mr. THOS. BINNIE (Cairns): In his reference to calamity-howling the last speaker has attacked the sugar industry in a way that was uncalled for. I would like to say this, however: We have not been trying to force ourselves and our industry upon the Southern people, but the Southern people have seemed to practically force us forward in a way that we did not need. I think there has been too much prominence given to the sugar industry. I live by sugar, but I think the industry has occupied too much of your attention here.

VOICES: No.

Mr. BINNIE: Mr. Robert has read a paper on a sugar refinery. He is my next-door neighbour, but I do not believe in the paper he has read. The Mulgrave Central Mill and the other central mills that are doing well will object to being forced into a scheme that will financially associate them with mills that are not doing well. In a way I do believe in the principle of Mr. Robert's paper, but, as said before, a mill like the Mulgrave would object to have to take the Mount Bauple under its wing. (Laughter.)

Mr. W. P. COOKSLEY (Brisbane): It was not my intention to speak on sugar at all, but, after hearing Mr. Robert's excellent paper, I think it necessary to say a few words. So far the Government have assisted the canegrowers with central mills, and I think it is only right that they should go the whole hog or none at all. They have done half the work that is necessary. Why not let them do the other half? If they have provided for the crushing of the cane, why should they not provide, under the same system, for the refining of the sugar also? We have heard a good deal upon the black labour question, and I may say that I am thoroughly in accord with what the bulk of the speakers have said. It is we Brisbane people who know the amount of produce that is sent away from Brisbane, North, for the sugar plantations. But there is one thing I want to say to the sugar people, and that is: Never go to New South Wales or Victoria for your produce. Our Southern farmers on the Downs and below the range can provide sufficient produce for the whole of the North. Under federation we must combine the whole of our industries, so that one will work with the other and the whole of Queensland benefit thereby.

Mr. P. BIDDLES (Tiaro): We have taken up a large contract in the central mill system. It appears that sugar cannot be grown without black labour. The next question is: If it cannot be grown without black labour, what is to become of the central mills and the money that should go to the Government if we are to be prevented from using black labour. The next question is that there seems to be a very large profit made by the refineries, judging from the reports we see. If one refinery makes such a very large profit as it does by the dividend that it pays, surely a refinery for the central mills would also return a large dividend. Now, we know that Government money is invested in these central mills, and I therefore say that this paper of Mr. Robert comes very close to the question. It would accordingly be wise for us to impress upon the Government that we should have such a refinery. If we look up the addresses of the candidates for the last election, we will find that nearly 50 per cent. speak of the necessity for a central refinery. I am sorry to say, however, that we have not heard anything of the scheme since they got into the House.

Mr. E. ROBERT (Cairns): When I was in Brisbane, coming through, I interviewed Mr. John Newell, member for Woothakata, in this matter, as it is one in which he takes a great interest. I showed him my paper, and he said he would bring the matter forward in the House. I also saw the member for Cairns, Mr. Thomas Givens, and he assured me that he also would support it. As we have got such a lot of money invested in these central mills, it is nothing but right that we and the country at large should reap the benefit of that money. At present most of the mills are behind in their payments, and it is necessary that we should have a refinery to clear ourselves.

The Hon. D. H. DALRYMPLE: I have no doubt that if the gentlemen whom Mr. Robert has mentioned have promised to take the matter up, in course of time it will come before Parliament. With regard to Mr. Robert's inference relative to the enormous amount of money at the command of the Government, I think he will find that this is not altogether in accordance with facts. Whatever opinion we have with regard to the profits to be made by establishing a refinery, I may say for myself that I have started off on several occasions to make a profit on paper and on facts which appeared to me to be incontestible. But as Mr. Robert himself said, with regard to the central mills, that those who started believed they were going to lie on a bed of roses and subsequently found a number of thorns, so I have found out that when I endeavour to obtain wealth there were, as a rule, a good many more thorns than roses. We have now got over the sugar discussion, which one gentleman said has rather monopolised the time of the Conference. I am not in the least responsible for the papers that have been sent in by members of the Conference; but I think, if the gentleman who spoke will look at the subjects on the programme, he will see that there has been a very fair distribution of matters of public and general interest. We have dealt with farmers' organisations in more than one article. We have considered federation, and we dealt with the intensely practical matter of railway freights.

We discussed a subject of huge importance in the paper on cheap money. We have dealt with wheat, and I do not think the delegates are to be blamed for devoting half of an evening to the subject of sugar when we are meeting in a city which—and I hope I may not be giving my constituents offence—may be called the sugaropolis of Queensland. Then there was the question of manures, and now we have just concluded sugar, which is certainly a much sweeter subject. There is another matter which I would just like to mention, that justice may be done to an officer of the Government whose services we estimate at a very high value. I say this in order that no injustice may be done, for I always believe that of all things we should be careful that justice should be done by one to the other. I think that, knowing that Dr. Maxwell is an expert of Australian repute—I might say of American repute, and I do not think I would exaggerate if I said of world-wide repute—knowing also that he was in Bundaberg, and was possessed of more information and experience of a scientific character in connection with sugar than probably any other person in Australia—one might say, why did not Dr. Maxwell come here and give the benefit of his experience? I believe the reason is this, and I venture to believe you will approve of it: The sugar question is an agricultural question, which is one of the reasons why it has been put forward. It is a commercial question; it is an economic question; and in certain respects it may be called a social question. It has been dealt with by several speakers from that point. Another thing, it is distinctly a party and a political question, and one which is being dealt with all over the whole wide Commonwealth of Australia. If Dr. Maxwell is going to have that influence which I think a man of his value and high attainments deserves, he is perfectly right in keeping himself clear of any question which may be considered political. Therefore, I believe, that Dr. Maxwell's conduct has been not only that of a clever scientific man, but also that of a man of discretion who knows when to speak and when to be silent. (Applause.) I am glad to see that his action receives the approbation of this meeting.

Mr. Robert's paper, on the motion of Mr. Limpus (Currajong), was then referred to the Committee of Resolutions.

Mr. E. Grimley, of the Acclimatisation Society, Brisbane, then read the following paper on—

COTTON.

As lately some little attention has been paid to the subject of cotton, especially in the *Queensland Agricultural Journal*, articles having appeared by the editor, Mr. A. J. Boyd, and Mr. D. Jones, of the Department of Agriculture, who for a number of years have been enthusiasts in the matter, I thought I might as well give this Conference what little information I have on the subject, especially as I propose to treat the subject from an entirely different point of view from the writers mentioned.

I do not purpose telling you how to grow cotton, as I expect most of you know a great deal more than I do on the subject, but I hope to show you that under certain conditions there may be a future before cotton in Queensland.

Cotton has been grown in Queensland, with intervals, for the last forty years, as in 1860 there were 14 acres under cultivation; in 1861 there were 395 acres; remaining stationary until 1866, when 2,884 was the acreage, rising rapidly until 1869, when the maximum of 14,684 acres was reached, falling to 4,149 in 1874, until, in 1878, only 37 acres was the total. In these early days cotton cultivation was stimulated by the Civil War in America, and consequent high prices, and an added stimulus was given in the shape of a Government bonus. When the war ceased prices fell, and about the same time, or soon after, the Government bonus was withdrawn, and the bottom fell out of the cotton industry in Queensland, sharing the fate of most industries that are unduly stimulated by Government help. A slight revival took place in 1891, stimulated by the encouragement given by the Ipswich Cotton Company. For reasons not necessary to mention here, the cotton company closed up, and again the cotton industry was stranded. I have endeavoured to gain some information as to the returns received by the growers, sending out circulars to many who had experience in the early days and in the revival spoken of, and I have to thank those gentlemen who so kindly responded to my request for information. From these answers I gather, taking an average, that the return of uplands cotton was 1,000 lb. in the seed, giving 333 lb. of clean lint per acre. The

average cost of tilling the land and delivering at the ginning mill is put down at £2 per acre; the cost of picking at ½d. per lb.; the cost of ginning at 5s. per cwt., including the bale and delivery at ship's side; whilst the freight to England and other charges come to 1d. per lb. of lint, or a total of £6 4s. 5d. per acre. The value of good uplands cotton is now about 5½d. per lb., or £7 12s. 7d. for 333 lb. (the average lint per acre), and the value of the cotton seed (666 lb. from the acre) is put down at 28s., or a total of £9 7d. Putting these figures in tabulated form they are as follows:—

Value of lint per acre, 333 lb. at 5½d.			£7 12 7
Value of seed per acre, 666 lb.			1 8 0
Total			£9 0 7
Cost per acre—			
Tillage		£2 0 0	
Picking		2 1 8	
Ginning		0 15 0	
Freight		1 7 9	
Total		£6 4 5	

Or a profit of £2 16s. 2d. per acre.

In dealing with these figures, I must mention that 5½d. is a high price per lb., quite beyond the average, which has been 4d. for the last ten years. And again, I am not aware that there is a market in Queensland for cotton seed, so that a grower would probably have to make use of his own seed to feed his stock, until in course of time a demand would spring up. I gather that the price of cotton, for various reasons, is likely to keep up for some time, but if a drop should take place, say, to the average price, the whole of the profits would vanish, and I take it that these figures are rather an insecure basis for working up an industry with a probability of stability. However, Mr. Jones, mentioned before, informs me that a better market for our cotton can be found in Japan, the particulars of which I have not ascertained.

Having given some slight history of cotton in Queensland, and touched upon the industry as it now stands, I pass on to what really constitutes the object of this paper—namely, the improvement of the varieties of cotton. At the last Conference I prepared a paper on the "Improvement of Sugar-cane Varieties," and I endeavoured to show how this should be done. I showed how beet sugar had become a factor in the world, how from being practically a weed the beet had advanced in such a manner as to cause a collapse in cane-sugar, and is now the primal cause of the languishing of the sugar industry in Queensland; how it had been possible to create an industry in beet-sugar in Europe of £50,000,000 a year, and I went on to show how this had been chiefly brought about by the principle of "selection," and it will be my duty to try and show how this same principle can be applied to cotton, and that if so applied successfully it may have the effect of once more reintroducing the cotton industry in Queensland.

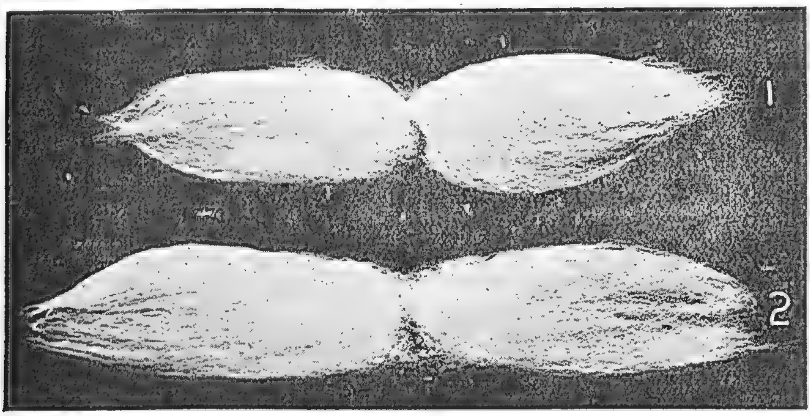
What is "Selection"? It is taking advantage of the natural capacity of all plants to vary in some particular, or, as Darwin puts it, it is "the law of the preservation of the favourable individual differences and variations, and the destruction of those which are injurious." These variations are mostly brought about by change of environment, such as a removal from a higher latitude to a lower, or *vice versâ*, from a rich to a poorer soil or the contrary, again from wet to a dry soil, or the other way about. Any of these changes may bring about a variation, and an observant man on the lookout for any variation will soon be rewarded; in fact, changes of some kind are sure to take place, inasmuch as it is seldom two plants resemble each other in all respects. Probably no one ever grew a dozen plants even from one pod of seed which all resembled each other without some difference, however slight. It will be as well for anyone having the intention of trying to improve any crop to have some definite plan to work on, to set up an ideal and not to swerve from it.

We will therefore consider what are the main points which constitute a valuable crop of cotton—probably length of staple and quantity of lint per acre are the main points to be considered. Taking length of staple first—there are several points in judging the staple or fibre—not length alone. There is uniformity of length, silkiness, lustre, twist, and strength. All these have to be considered when judging which is the best form of fibre to perpetuate. Nearly every cotton plant will differ one from the other, some superior in one direction, some in another, and it will be by judging your mother plants by points, giving so many points for each degree of excellence, working up to your standard, that your ultimate choice will fall on that plant having

the greatest number of points. As an example, I will give you some information gathered from American sources of results of experiments carried on towards the improvement of sea island cotton.

Glossypium Barbadense, getting its name from the island of Barbados, or, as it is popularly called, sea island cotton, is generally grown near the coast in the United States, not being suitable for growing in the interior, like *Glossypium herbaceum*, or uplands cott n; it was generally grown as a perennial, and for a long time was entirely unsatisfactory, giving but poor returns. However, by carefully selecting early-maturing seed and practically changing it from a perennial to an annual, by selecting the best seed, and by better cultivation, a new race has been evolved, and it was at this point when American sea island cotton was the best in the world that a gentleman named W. A. Clark determined to try and make a still further improvement in the quality of the staple, and by applying the principle of selection he has so far succeeded that he is now obtaining as much as from 50 to 60 cents per lb., or 2s. 6d. to 3s., for his cotton, the usual price being from 25 to 30 cents per lb., or 1s. to 1s. 3d. His plan of operation was as follows:—He carefully went over his fields in a rough manner, marking each plant appearing to be superior to the others; later each of these marked plants was subjected to a more careful examination in the field, and the number was reduced to five, and the bolls of fibre and seed were picked and reserved for future and more minute examination. Points were then given to each for its good qualities, and ultimately the palm was given to one plant; but before decision a sample of the fibre was sent to the manufacturer for his approval, who examined it microscopically, and reported thereon. A final decision having been made, the seed was planted at the right time, the seeds from a single plant being about 500 in number. The result of these 500 plants gave enough seed for 5 acres the following year, and the 5 acres the next year gave enough seed for the general crop.

The plants grown from the 500 original seeds were inspected and subjected to the same tests for further crops, it being found that any neglect to select caused a rapid decline in quality; in fact, there was a reversion to the original quality before selection, so that to keep up the quality the process must be continuous. This quality of cotton secures orders from the manufacturers direct, without being sent to the open market, and quotations for such do not appear in the trade lists. To give an idea of the advancement made by these experiments, I give a few illustrations:—



No. 1 is the ordinary sea island cotton, whilst No. 2 is the sea island improved by selection. You will notice that the staple in the selected cotton is much longer, but the other qualities, such as silkiness, softness, twist, and strength, cannot be reproduced. No. 3 is a sample of sea island cotton grown in Queensland, by which you will see that there is plenty of room for improvement by selection.

In choosing the mother plant for seed it is necessary to take into consideration not only the value of the staple, but also the general condition of the plant—its healthiness, its productiveness, its general all-round suitability—in other words, it is no use picking out one particular boll of exceptional merit, and expecting that the seedling plants will resemble its parent; it being now an accepted fact that the seedlings will resemble the general characteristics of the parent, and not the characteristics of one boll or branch. I am now speaking of seedlings, but in the event of one branch showing a special character worthy of being perpetuated, it would be as well to strike that branch from a cutting, and if the second year the character is forthcoming, to continue the process for four or five years, and in all probability the seed would then carry the character and become fixed, to use a gardening term.

Then, again, as to increasing the quantity per acre, which in its way can probably be made as profitable as improving the quality of the fibre. It is known that this is being done in the States, not only by high cultivation but by selection; certain seeds are enveloped by a larger amount of lint than others, and by careful selection these can be secured; this has been done to such an extent that the proportion of lint in sea island cotton is now as one to three, whereas before selection was brought into action it was one to five; then certain plants are very much more floriferous than others and naturally carry more lint—these can be marked and secured; it has also been found that the lower half of a cotton plant will give you seed which will give larger returns than the upper.

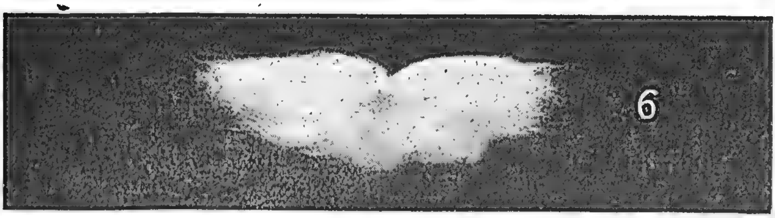
In dealing with the question of increasing the quantity per acre I have left out of consideration the fact that there are some varieties of cotton now available which give greater returns than others; for instance, one variety of Egyptian cotton is shown to give 500 lb. to the acre, but how far this is attributable to the system of irrigation carried on in Egypt I do not know; moreover, this variety of cotton requires less irrigation than others. Is not that a point that can be utilised—a variety that does not require as large a rainfall as others might be grown in districts where the fall is light. It is also to be considered whether it would not be advisable to try to alter the maturity of the plant to an earlier or later period; for instance, a plant which will mature its crop before the rainy season sets in would be advantageous, or again, if the crop ripens after the rains are over, it would be a gain, as those who have grown cotton in the old days can remember only too well how the crops were spoiled by the rain, the seed in the boll beginning to grow and yellowing the lint, or if secured the material fermented for want of proper drying.

So far, this paper has dealt only with the improvement of cotton by the process of "selection," but there is still another mode of improving cotton, and that is by cross-fertilisation or hybridisation.

To quote from the Year-Book of the Department of Agriculture of the United States, to which publication I am greatly indebted for information contained in this paper, "selection" when used alone in the improvement of plants depends upon the adding up of small unimportant variations through many generations, which in the end may give marvellous results; but by this method the breeder has no means of forcing any change, but must be satisfied with slight variations and long-continued selection. However, when marked changes and new creations are desired it is to hybridisation that attention must be turned. In the words of Henri de Vilmorin, "cross-breeding greatly increases the chance of wide variation, but it makes the task of fixation more difficult. It, however, gives the raiser the only means in his power to unite in one of the qualities of two different plants while discarding the weak points."

The attempt to produce a hybrid has been tried by the same Mr. Clark who carried on the selection improvements, and I will now give his experiences. It is obvious that it would be useless to endeavour to obtain a greater length of staple only to be spoilt by the saw gin used in uplands cotton. So Mr. Clark, knowing that a variety of uplands called "Peterkin" sometimes has bolls with free seed, or comparatively so, carefully watched for some of these seeds, and sowed them; the following year a larger proportion was free, and by selecting for four years he obtained seed that was all free. The object was to obtain a variety that combined the robustness of the upland combined with the freedom of seed and the greater length of staple of the sea island, and Mr. Clark then crossed or hybridised the free-seeded uplands, which he called "Klondyke," with the sea island. How far the experiment was a success can be gauged by the illustrations.

No. 4 gives you an example of uplands cotton, whilst No. 5 gives a drawing of the new hybrid between "Klondyke" and sea island. You will notice a great improvement on Klondkye—greater length of staple with free seed. As this hybrid has but very recently been produced its commercial value is not known, but in all probability it is of great value. In No. 6 I give an illustration of Queensland uplands cotton, which again, as in the sea island variety, shows that there is ample room for improvement by either the process of selection or hybridisation. I do not think any attempt has been made in Queensland to improve the quality of cotton in any direction, but I am convinced that it will be only by the application of the two principles advocated, either singly or together, that we can hope to reintroduce the cotton industry. I may mention incidentally that the society I have the honour to represent at this Conference has decided to attempt this important work; that they will be successful in producing a variety which will give a good return to the acre as well as an improved quality of lint is warranted by the success obtained in other countries, and when we look round



and remember how nearly everything now grown has been improved, how the apple of our days is descended from the crab, how the cabbage of 30 lb. weight is the result of "selection" during centuries from plants that weighed not more than a few ounces, how wheat has been improved, how beet sugar has trebled its percentage of sugar, surely we may expect the same improvement can be made in cotton, and before many years I hope to see Queensland cotton quoted on the European market—not as a variety of uplands or sea island, but as a distinct variety that has been evolved by the skill and cleverness of our farmers, and if it should happen that the Queensland Acclimatisation Society should lead the way, there is still plenty of room for others to follow.

There is just a possibility that the Commonwealth Parliament may adopt a policy of protection, and that the duties on cotton goods may be sufficiently high to encourage the manufacture of such goods, which would be a great encouragement to the production of cotton, although in that case the cost of living and consequent cost

of raising the product would to a certain extent act as a deterrent. However, that is a point somewhat outside the scope of this paper.

In concluding my remarks, I would like to say that I think if any revival takes place in the cotton industry it will not take the form of a profitable speculation for the capitalist, but will probably take a place amongst the mixed farming of the man who tills his own land, and who can command sufficient labour for picking from his own family and the families of the few hands he may employ.

I hope that I have made my paper sufficiently plain to those who take an interest in cotton, and if any amongst you should decide to take the improvement of cotton in hand, I shall be sufficiently rewarded.

DISCUSSION.

Mr. J. W. LEE (Zillmere): When I first came out to Queensland I took up, along with a number of others, a piece of land on the Pimpama River to be worked as a communal settlement for the production of cotton in a British colony, and I may say that I do not think better cotton has been grown in the world than the staple we then produced. We grew Sea Island; and although the kinds illustrated in Mr. Grimley's article are very fair, I consider that we beat them hollow on the Pimpama River in those early days. I do not know Mr. Grimley; but I have some interest in this question, and have often advocated the production of cotton—for it can be grown in Queensland. We sent six bales of our cotton home to Lancashire, where we came from, and with them a letter stating how they had been produced. This letter, I may say, was published in the *Manchester Guardian*. That cotton, however, when it got to London, sold for 5s. 1d. per lb. That is a fact. Sixty-one pence per lb. was the return we had back through our agent, Mr. George Bourne. The Manchester people made the remark in their paper that they had never seen a finer sample of cotton from any country in the world. That was an opinion from a cotton manufacturing district, and it was cotton that brought me out here, for at that time, owing to the American war, there were thousands of idle men walking the streets of the town of Lancashire. Not that I was a factory operator myself, being an engineer by trade. I came out here, however, with a number of others, took up land, and the first year we put in 10 acres of cotton with spade labour. We did not use a plough even, and it was from those 10 acres that we got the cotton which returned 5s. 1d. per lb. in London. I know they did grow cotton in Ipswich. It was not the Sea Island, however, but the short-stapled variety, or the Uplands cotton. That can be grown here, too, and I have in my possession to-day, cotton grown in Zillmere quite equal, if not superior, to anything that is illustrated in the paper. I have grown good cotton within the last four years. The difficulty with us at Pimpama was that we were a communal settlement, like many others that the Lancashire people were fond of getting up in those days. The Government helped us; everybody helped us; but the people themselves could not work together under that scheme, and hence it fell to the ground. I lost £400 in wages alone. Each of us agreed to work for two years and draw no wages, although of course we had our food and clothing. We planted our cotton, but finally all the people cleared out and left me with it. I believe that under proper management, Queensland is not only capable of growing cotton, but of manufacturing it, too. The climate is good for spinning operations, and everything else is in its favour. They sent for me from Ipswich when they commenced the factory there, but I told them then that as sure as they started it on the lines they were proposing it would end in failure. If you go in for manufacturing cotton you must go in for it on a large scale, otherwise you are wasting your time and money. You want men with capital to start a factory to produce as much cotton goods as the whole of Australia requires. When that is done there will be an opening for the grower. There is one difficulty with cotton culture just as there is with sugar: When the cotton is ready to be picked, the work must then be done. I think I see the bushes on the 60 acres we had as if snow had been blown thickly over them all. That is when the cotton must be gathered; for, if the operation is postponed and rain comes, your crop is ruined. The only way out of the difficulty I see is for a man to limit himself to a small area, such as 20 acres, and let his children pick the cotton.

Mr. John Williams (Mount Gravatt): It gave me great pleasure to listen to Mr. Grimley's paper, for I think cotton will come to the front again. Mr. Lee has told us of the beautiful cotton they used to grow, but I believe experts have been to work, and a better sample than formerly is now produced of cotton. If we start again, we shall doubtless have a better sample to work on. Mr. Grimley touched upon the matter of selection, and said that a great variation was caused by, say, planting from high to low land. But there is another factor which he did not refer to in his paper, and naturally so, for a paper must be somewhat limited in its scope. Seed variations are largely caused through the scattering of the pollen by bees and the winds. I have had mandarins quite bitter, and this I attributed to insect agency and chance fertilisation. I believe the Japanese got their plums that way, as they never push very much with cross fertilisation by their own hands. We have in mandarins some very good kinds, the Beauty of Glen Retreat standing pre-eminently before the world. Then there are our wheats, and I say, if we want to have wheats that will be first-class and bring Queensland to the front, they then must be of our own raising. We see that in wool, where the theory is an accomplished fact. I am sure, if attention is paid to cross fertilisation in the matter of the cotton industry, that we shall produce a cotton with long staple, fine quality, great strength and elasticity, and bearing large pods.

Mr. J. Davies (Rockhampton): I wish to ask where it is possible to get cotton seed. I have grown cotton, and it is something like the No. 6 of this paper. I should also be glad to know what soil is best adapted for cotton.

Mr. L. G. Corrie (Brisbane): I would like to say, first of all, that with federation coming there is a better chance than there was before for establishing the cotton industry. If cotton is going to be grown in Australia, I think we may look for it, in all probability, being grown in Queensland. With interstate freetrade and the protection which I expect we shall have against the outside world for a considerable number of years, there will be inducement for the establishment of a factory such as has not existed before. In connection with what has been said about seed, I may say the Acclimatisation Society has already arranged for the importation of the best seed we could get from the States. It is also the intention of the society to import some Egyptian seed, and I can promise any delegate interested in the cotton industry that, if he requires any seed for experiment purposes, we shall be pleased to let him have a little from whatever surplus we have after meeting our own requirements. I would point out that the process of selection is not a very complicated one, and anyone could carry it out. It is simply a matter of watching the best plants, picking the best pods, and so on. It would be inadvisable for a person to start with the seed at present obtainable in Queensland, for there does not seem much doubt that seed of better kinds can be obtained elsewhere.

Mr. J. Wilson (Freestone Creek): I was a grower of cotton, too, many years ago, but wish to point out that we are losing sight of the bonus that was given by the Government for five years. There were also £5,000 given to the Ipswich mill. We grew cotton at Warwick for a couple of years, but the thing died a natural death. I think it would be foolish for the Government to spend any more money on it.

Mr. D. Jones (Agricultural Department): Just a few words by way of reference to the cotton industry. I know the hour is late, so I shall be as brief as possible. Mr. Grimley has rather under-valued the yield of cotton-meal. I think his values were about 28s. a ton, but I can appeal to you sugar-growers if cotton seed is not worth more than 28s. a ton. We have experienced in connection with our mill at Ipswich, that we could sell our seed for more than 30s. a ton. The decorticated cotton seed often fetches as much as £6 to £7 per ton. If Mr. Grimley's ideas come to anything with regard to the improvement of the staple, as I hope they will, then we may rely on better profits than we have been accustomed to. As far as the West Moreton experience is concerned, during the latter years of the cotton revival, there was not much grumbling at the profit. I am going to admit straight away that the farmers had a very

serious grievance against the action of the cotton company in not being able to receive their money promptly. Being a director of the company, and possibly an earnest advocate of its creation, I must admit there were some mistakes made, but these mistakes have been made all over the world. I may tell you that such men as the Hon. T. B. Cribb and the Hon. A. H. Barlow were with us in the organisation, and if we did make mistakes we made them in good company. I shall give a few reasons why cotton should be established. In the first place, it is a very cheap crop to grow. It is not costly to plant, and it does not require many implements to do the work connected with it. You can plant it as easily as maize, and you will obtain a better profit from cotton than you will from maize. It comes in very useful as a rotation of crops. I have known men who failed to grow anything profitably on a piece of land until they grew cotton on it. Then they realised a handsome profit. The establishment of the cotton industry may give rise to secondary industries connected with the manufacture of cotton goods. The money spent by the Government on the cotton company at Ipswich I maintain was well spent. It is a matter of misfortune that we did not succeed in pushing the industry as far as it deserved, and that is as far as it would supply the capacity of the Commonwealth of Australia. I have brought samples of cotton with me, and can give ocular demonstration as to the quality of the goods we did manufacture. These will prove for themselves that we made an honest article and sold it at a moderate price. I have here evidence of the quality of the cotton which we grew and the names of the varieties, and, if you wish to examine the cotton after the meeting, you can compare the quality of the cotton which we grow now with the quality of the cotton you remember thirty-five years ago. From what I remember myself, and from what others have admitted to me, I think I can safely say that the quality of our cotton now shows a very marked improvement on that produced in the very early days. There is a good market for cotton in Japan. The freights to that country are cheap, and there is a vast demand there for the staple. Japan imports an enormous quantity of cotton from the United States. I shall be glad to give any further information about cotton. I have had experience of it for over thirty years, and I think I know something about it. One gentleman asked the best kind of soil for cotton. Well, you do not want the best of land, and you can use ground which might not be profitable for other crops. Our best successes were upon black sandy loams. Rich scrub land is not so good, because it runs the cotton into bush at the expense of the fibre.

Mr. R. C. LETHBRIDGE (Mitchell): I would like to know whether cotton would grow in the interior. I have grown it in the Maranoa on a small scale, and from what I saw of it I think it would be a valuable adjunct to any farmer growing wheat or other cereals, especially if he had a big family. Of course cotton must be picked when it is ready, for if the rain comes on when it is in bloom the colour is spoiled.

Major A. J. BOYD (Agricultural Department): I do not claim to be infallible on the subject under discussion, but I have grown cotton, bought cotton, ginned cotton, sold cotton, exported cotton, and in fact revelled in cotton for years. I may therefore be pardoned for claiming to know something about it. Of course the main points at issue are—what will it cost to grow cotton, where are the markets, and what profits are you going to get. First of all, Mr. Jones has told you our best market is Japan, and he is quite right. At present ginned cotton is worth 5½d. per lb. If 5½d. is the price for ginned cotton, the question arises what price can the buyer afford to pay the grower. A good crop grown on not too good a soil—a sandy loam is one of the best, while heavy clays and rich downs country are hardly suitable—will produce at the rate of 1,000 lb. of seed cotton to the acre. That 1,000 lb. will give you 400 lb. of lint. That at 5½d. per lb. is worth over £9. The cost of putting in an acre of cotton would be about £3 2s., and the cotton which is produced will sell at about 1½d. per lb. We used to pay 3d. and 2d. in the good old boom days. Supposing 1½d. per lb. is paid, you have a

profit of something like 15s. an acre more than you would get from maize, and in fact, from what I have heard of some of the sugar districts, where the average return of sugar is 5 tons of cane per acre, cotton would pay far better to grow than sugar-cane. There is no doubt about markets. There is an unlimited demand for it. America sends 1,800,000 bales of cotton annually to Japan. How is it sent? It is grown in Louisiana, Florida, and other Southern States round the Gulf of Mexico. It is sent to New York by train, then across to San Francisco, and from thence to Japan. There is another reason why cotton should look up here, and that is because in the United States they are getting more and more cotton-mills. They are using up something like 7,000,000 bales in the cotton-mills of the States, which formerly went to England. England has got to be supplied with cotton; and if the States send their cotton to Japan and use it up in America, then some other country must produce it to supply the English market, and there is no better country in the world to do so than Queensland. The picking of cotton is not a bugbear at all. In the early days, when we grew cotton all over the West Moreton and Logan districts, the holidays of the State schools were made to fit in with the cotton harvest. Cotton-picking begins in May, and runs on for twelve weeks. Sugar-cane has to be cut straight off the reel, but there is no hurry about cotton-picking. You do not begin early in the morning when the dew is on the cotton, but wait till it is quite dry, say at about 10 o'clock. I have known a family with four children, and those four children at the beginning of the season earned 11s. a day, and in the thick of it £1 a day. They were paid at the rate of ½d. per lb. It is no use trying to grow cotton on a big scale in Queensland, for you would be immediately confronted with the labour question. If cotton is to succeed in this country it will be by the way sugar is succeeding now—that is, by small farmers putting in small areas, and working it by the help of their families or neighbours. Big estates of cotton are not to be dreamt of here. With regard to what Mr. Lee said about Sea Island cotton, I may say that it will not pay to grow that variety in Queensland, because it invariably runs to wood at the expense of the fibre, unless well pruned, and cotton will scarcely bear the expense of pruning.

Mr. T. E. Coulson (Rosewood) also spoke on the subject.

Mr. E. Grimley: I am very glad my paper has brought so many people up to speak upon it. Mr. Lee has given us some information about the growth of cotton, and I am pleased to find that such a good article was produced in those early days to which he refers. If it could be grown then, it could be grown now. Mr. Lee stated he got six bales of 300 lb. from 10 acres—that is to say, he got 180 lb. of Sea Island cotton per acre.

Mr. Lee: I did not say the bales were 300 lb. They were 200-lb. bales.

Mr. Grimley: Mr. Williams, who is a practical man, spoke a few words in favour of my scheme, and I was pleased to get the opinion of a man who knows so much on that subject. Mr. Corrie has already informed Mr. Davies that the Acclimatisation Society is importing a quantity of cotton seed from America and Egypt. Mr. Jones gave us a lot of information about the manufacturing of cotton which hardly comes within the province of my paper. Mr. Lethbridge asks whether cotton would grow in the West. I do not know personally, but Mr. Lethbridge has experience that it will. If it grows well in small quantities, it should do well in large. I know it grows well at Cooktown. Professor Shelton, who saw some growing there, said it was a splendid sample.

Major Boyd: Some beautiful cotton came down to Brisbane from Roma last week.

THE WATER HYACINTH.

Mr. L. G. Corrie (Brisbane) proposed that the Committee of Resolutions be asked to frame a resolution relative to the water hyacinth. This was carried.

THE SUGAR DELEGATES.

A request was received from Mr. E. SWAYNE (Mackay) that the delegates from the sugar districts be allowed to absent themselves from the next morning's session, and this was agreed to.

SEVENTH SESSION.

FRIDAY, 14TH JUNE, 1901, 9·30 A.M.

Business was commenced by the referring to the Committee of Resolutions motions submitted by Mr. F. WILLIAMS (Upper North Pine) and Mr. H. CATTERMULL (Woongarra), suggesting that papers for reading at future conferences be in the hands of the Agricultural Department a few weeks before the date of the Conference, and that these be printed for the information of the delegates.

Mr. J. E. DEAN, of Woodlands, Maryborough, then read his paper on—

TUBERCULOSIS IN DAIRY CATTLE.

It is not my intention to occupy the time of this Conference by describing what tuberculosis is, for you have no doubt read some of the many descriptions which have from time to time been given by scientific men. I may say that I have witnessed the *post-mortem* examination of quite a number of dairy cattle which have succumbed to this much dreaded form of consumption. I have seen it from the small seed-like state to the large tumour, and in cases when the lungs were a mass of corruption.

Those animals are sold in England to the "knacker" or "slink butcher," and many choice pieces are sold by him to keepers of cheap boarding-houses and to street vendors of hot pies, the remainder being sold as dogs-meat, and is eaten in a raw state, and the dogs are allowed to lick the hands and faces of the children with which they are allowed to play, and thus convey the germs of disease to the children, and the blame is laid upon the milk of the poor innocent cow.

I may say that I have a deep respect for the researches of scientific men, but I am afraid that they sometimes give us theory instead of science—*i.e.*, knowledge. And when their statements are not borne out by practical results we have a right to object.

Professor Virchow, of Germany, is said to be one of the best authorities on the subject of tuberculosis. He makes this very startling statement:—" One tuberculous cow is enough to depopulate a whole village." A statement like this makes one certain, like the Irishman, who, seeing the living organisms in a drop of magnified water, said: "Begorra it's a wonder we were not kilt before we were born."

Some three or four years ago, two cows amongst the forty head of which Her late Majesty's herd was composed were found to be in an advanced stage of tuberculosis. Upon applying the tuberculin test, thirty-four others were found to be affected—a most startling discovery indeed, especially as the whole product of the herd was being consumed by Her Majesty and the members of her household. Now, how is it that, if one tuberculous cow is enough to depopulate a whole village, thirty-six such cows failed to annihilate the entire household, and the Queen along with them? It is well known that Her Majesty used both milk and cream very largely, yet she enjoyed good health, and lived to a ripe old age. We must admit, Sir, that theory is not borne out by practice in this case at least; and I may say that, after more than twenty years' observation, those who use the largest quantity of milk enjoy the best health. And I have been forced to the conclusion that the cause of the large infantile death rate is not from the use of milk, but from an insufficient supply of milk and suitable food to meet the requirements of the growing child and to fortify the body against disease. How many husbands there are who spend their money in drink and leave their wives and children short of necessary food to nourish their bodies, the poor mother having to undertake the duties of motherhood with a body unequal to the task; as a result weak children are brought into the world to be ill-fed and to find an early grave. Often the mother has to leave the washtub, the scrubbing, and other duties, bathed in perspiration and weary in body, to give her babe the breast, and is unable to satisfy the little one's want and has not the money to purchase the necessary milk to develop her child. Too often the little one dies from consumption, and then the cry goes forth that milk from tuberculous cows is killing our children. But we *must* have *revenue* from the drink even at the cost of the very life's blood of our fellow-creatures. I wish means could be found to prevent men from sacrificing the lives of those whom God has entrusted to their care.

Scientists tell us that if a tuberculous cow licks her calf it is likely to contract the disease. The official records show that out of 200,000 calves killed at the abattoirs in Berlin only four out of that number were found to be affected with tuberculosis. Pigs are also supposed to contract this disease from the milk of cows so affected. It is a well-known fact that pigs fed on separated milk are the freest of all from disease, while those to which no milk is fed, are found to suffer the most from tuberculosis.

I could give a number of facts in this connection, though I would rather have a good discussion than write a long paper, as no doubt more good will result from the opinions of many.

If milk is injurious, then why do our medical men recommend its use? We must conclude that they find it to be beneficial. And we certainly see those who, from fever and other causes, are laid at the very gate of death, and whose vital powers and power of resistance are at the lowest ebb, yet from the use of milk are brought back again to health, strength, and happiness. According to scientists, the use of milk ought to have snuffed out the flickering light of life. In passing, I may say that one of the American veterinary surgeons has tried to convey this disease to calves by feeding to them milk from cows known to be affected with tuberculosis. Up to the present time he has been unable to succeed. Some of them were killed when eighteen months old, and were found to be free from disease. I may also say that our Mr. Pound has changed his opinion on this subject during the last two years.

I would like to hear the opinion of the members of this Conference on the subject of the tuberculosis test which we are told will be forced upon us by the Government in the near future. Personally, I cannot see the good results which are supposed to follow its use, I can see many unnecessary losses, besides an enormous expense to the State. And if it were possible to destroy every animal affected with this disease, we would have another lot to destroy in six months' time. We cannot find any class of animals, or fowls, or birds, whether domestic or wild, which are free from tuberculosis. There is no country in the world in which it does not exist, and the Americans have abandoned the attempt to eradicate it from their herds.

We also find climatic conditions have an influence upon it, for where the conditions are cold and damp, or where there is a heavy, humid atmosphere, as in low swampy country, there tuberculosis is found to abound. We find 17 per cent. at St. Helena, and only 2 per cent. on the high, light, dry tableland of the State. The percentage for Germany is 12 per cent., and in some countries much higher.

I have used the tuberculin test for a few head from which I wanted blood for inoculation. I will describe the method:—The animal is tested at 6 a.m., 12 noon, and 6 p.m., when the tuberculin is injected. The test is taken the next morning at 6 a.m., 9 a.m., 12 noon, 3 p.m., and again at 6 p.m. Now, we may say that five minutes is not too long a time to allow for testing each animal. We thus get twelve in an hour. Thus an inspector will have to work from 6 o'clock on Monday morning to 7 o'clock on Saturday night to apply the test to thirty-six animals; and the tuberculin will cost 18s. If we knew the number of dairy cattle in the State, we could then tell how large an army of inspectors we should require to go through our herds every six months as proposed. The cost would be something enormous. The cost would be not less than 3s. per head for every animal tested. What will be the use of testing them unless the affected ones are destroyed? If they are destroyed, who will bear the loss?

Now, I will admit that if these animals are a menace to the health and life of the people of the State, then the Government is in duty bound to protect and safeguard the interests of the people, regardless of expense or loss. But I maintain that this test is unnecessary, for an animal may be *affected* with tuberculosis and yet not be *suffering* from it. I would like you to note this distinction, for, until an animal suffers from it, I believe the product is good because the health is good; and when the health fails and the system is breaking up or wasting, then the animal had better be removed, either to be destroyed or to be put under treatment with a view to recovery.

I will suggest a plan by which we can, I think, do some good. I would divide the State into, say, five districts, and appoint a practical veterinary surgeon for each district, whose duty would be to visit every dairy and farm in his district and inspect all the cattle, and those which show outward signs of disease ought to be destroyed or removed from the others and put on trial, and an effort made, by suitable treatment, to restore them to health again. I would even go a step further, and suggest that an experiment hospital be established in each district where affected cattle could be placed under special treatment by the veterinary surgeon. We have, in the Wide Bay and Burnett districts, diseases which, up to the present time, have baffled all efforts to combat, and, no doubt, this applies to other parts of

the State. Mr. Pound has been appealed to many times, but no practical good has resulted. Mr. Pound is not a veterinary surgeon, and cannot be expected to do the work of one.

I have made these suggestions with a view to their discussion, and I sincerely hope that something may be done to bring about a better state of things. I would also have the veterinary inspector attend to the sanitary condition of the dairies. I am aware there is a necessity for this being done, especially in the case of those dairies from which the townspeople draw their milk supplies. Unclean practices and filthy surroundings are the great cause of sickness, and I am sure it is the duty of the Government to safeguard the health interests of its people.

DISCUSSION.

Mr. J. H. MAYNARD (Gympie): As far as this question is concerned I am inclined to alter my opinion in a measure from what I have heard since I addressed you last year on dairy inspection. My opinion is partly altered on account of a visit paid by one of the veterinary surgeons under the Health Department to Gympie a few months ago. It appears that the probable action of the Department will be that inspectors will go round and only test those animals that are apparently unhealthy, and those that are subject to tuberculosis will be destroyed or condemned. As far as the condemnation without destruction is concerned, I may say that, although a very pretty theory, I fail to see how it can be carried out practically in connection with most of our dairies. As a rule, the dairyman has not got a sufficient number of paddocks to be able to separate two or three cows from the rest of his herd. To my mind, it seems that an animal, if condemned at all, must be destroyed. I have not altered my opinion with regard to the risk a dairyman runs, and the necessity for some measure of protection. We cannot isolate cases. With regard to the remarks made about the milk, I must here differ with Mr. Dean. I think it is perfectly right that if cattle have disease they should be condemned, and their milk not go into consumption. I do not agree with him when he says that because milk was healthy no milk is injurious. As far as I can learn, tuberculosis in the system is not necessarily injurious to the milk. I gather from my reading that for milk to be a medium of contagion there must be tuberculosis in the udder, and the tuberculin test will not identify that. Therefore, we may have cattle condemned, although they may be absolutely harmless to those using the milk. I would like to hear Mr. Mahon on this subject. He is a thoroughly practical man, and knows this subject well. I would also suggest that Mr. Pound be requested to address the meeting. We would get more information from those two gentlemen than if half-a-dozen of ourselves spoke.

Mr. JOHN MAHON (Agricultural College): You will pardon me, but it is not my intention to speak upon this matter. We have got here Mr. Pound, a scientific man, and we all admit that he thoroughly understands his business. Therefore, if I were to talk to you for an hour I might say things which Mr. Pound would afterwards contradict, and be quite right in doing so. Further, I might make some startling statement which would astonish some of you.

Mr. MAYNARD: I thoroughly believe in scientific men, but I also believe in practical ones. The only way we can get science to be of use is to combine it with practice. We have here this morning the scientific man in Mr. Pound and the practical man in Mr. Mahon.

Mr. C. J. POUND (Government Bacteriologist): There is one thing I must regret, and that is I have so far been unable to deliver the lecture which I had arranged with the Department. There really appears to be some misunderstanding. Through some oversight, provision was not made for it on the programme, although I have all the apparatus here, and was requested by the Under Secretary for Agriculture to bring it up with me. It appears we cannot alter the programme now, so the matter will have to be deferred. Mr. Dean referred to the presence of tuberculosis in the late Queen's herd, and mentioned that no members of the Royal family were affected with tuberculosis. If Mr. Dean reads up that record he will find no reference to cases of tuberculosis of the udder. Unless you have tuberculosis in the udder, you cannot expect the germs of tuberculosis in the milk supply.

With regard to Mr. Dean's reference to the very healthy and florid look of our late lamented Queen, you must understand that, as a result of very exhaustive experiments, it has been found that healthy people are not so susceptible to this disease. The more susceptible people are young children. Mr. Dean stated that my opinion had been somewhat altered. I may say that my opinion has not been altered, and in support of that I will refer Mr. Dean to my paper in the April number of the *Queensland Agricultural Journal.* This was a matter which I wished to bring under notice at the illustrated lecture I proposed giving. In the St. Helena herd, three years ago, there were 23 per cent. of the animals affected with tuberculosis; but by our system we have not only eliminated every tuberculous beast from that herd, but during the last two years not a single animal has reacted, and we have given the St. Helena herd back seven animals which were the progeny of those disease-affected cattle. You can eliminate tuberculosis from your herd and keep the disease out of the herd. It is possible you may have a number of animals affected with tuberculosis. You have perhaps been striving to improve your herd, and the affected animals may be peculiarly valuable owing to their milking and other qualities. You can still retain the type and breed from these animals. You can raise a healthy herd of cattle from diseased parents. Not only have we done it at St. Helena, but it is being carried out in every dairy in Denmark and America. At the time I commenced to work at St. Helena, the late Dr. Scholes, of Goodna, requested me to carry out the same work at the asylum there. At St. Helena we drew out regulations providing that after the animals were tested there was to be a systematic disinfection of the stalls. This was done, and the testing carried out every six months. No animal was allowed to be placed in that herd unless tested and found free from disease. At Goodna, through some misunderstanding, although the animals were eliminated, there was no disinfection of the stalls. At St. Helena they carried out the disinfection with the result that at the last two testings, eighteen and twelve months ago, we found no diseased animals. On the other hand, at every testing at Goodna we found a number of tuberculous cattle, and the proof of their being tuberculous was borne out by *post-mortem* examinations carried out in the presence of the whole of the medical staff of the institution. If you feed calves with milk obtained from animals suffering from tuberculosis of the udder, those calves will suffer from tuberculosis. With reference to the cost of tuberculin: Of course, there is a considerable amount of labour attached to myself and the institute, but in connection with dairy inspection this tuberculin is given free At 6d. per head it is a very small cost. But I would be prepared to stimulate the use of this tuberculin by recommending that it be given free. We are getting appliances to manufacture it on quite an extensive scale, and really the cost of it will be almost *nil.*

In reply to a number of questions, Mr. Pound stated the further one got into the Western country the less tuberculosis there was. On the coast a lot of cattle were brought in to be stall fed, and in that way they ran a greater risk of being affected with tuberculosis. It was not to be forgotten that the sun's rays were the greatest germicide known. If any germs were left on the grass they were soon destroyed by the sun's rays. There was, therefore, no necessity to disinfect pastures. It was only necessary to disinfect places which the sun's rays did not reach. As for how to know when a cow was affected with tuberculosis of the udder, Mr. Pound said that tuberculosis was a disease that manifested itself in various ways in different animals. There was really no part of the animal which it was specially fond of. He had known cases of bulls where it was the testicles that were affected. A person could only definitely ascertain the presence of a slight manifestation of the disease in the udder by killing the animal, but, in a more advanced stage, a person could distinctly feel the hard, knotted condition of the organ. One or two or three quarters of the udder might be hard and indurated. He was not absolutely correct in saying that those symptoms would be diagnostic of the disease. The milk, however, could be taken and microscopically examined. If they contained tubercle-bacilli, of course the

inference was that the cow had tuberculosis of the udder. The main point was that tuberculosis could be eliminated from a herd of cattle if the owner wanted to get rid of it. He was speaking from a public health point of view, but at the same time he was working in the interests of the farmers and dairymen. Hardness in the udder was not necessarily a sign of tuberculosis. In Sydney, recently, a cow was brought in with an affection of the udder. It was condemned, and Mr. Pound himself thought it was tuberculosis, as did also the New South Wales Government veterinary surgeon. When the cow was killed and the affection examined, however, it turned out to be actinomycosis. If any of the delegates had any specimens that required examining, he would be pleased to undertake the work if they were sent down to him. He had to have some material to work upon before he could decide definitely what a disease was. All such examinations were carried out free. Milk samples could be sent to him. If tuberculosis were found present in one of these latter, it could certainly be said that it was obtained from a tuberculous cow. Experience had shown him during the past three years that tuberculosis was not hereditary, nor actinomycosis either. These two diseases were frequently taken for each other. Actinomycosis manifested itself sometimes with a large growth on the jaw, sometimes by an enlargement of the throat. But this enlargement might be either actinomycosis or tuberculosis. In any case, neither disease was hereditary. Mr. Pound stated that he would be pleased, provided his regular duties permitted, to visit farming districts where his services might be required, and give information on the subject of tuberculosis and other diseases.

Mr. T. DE MURRAY-PRIOR (Maroon): I think a resolution is to be brought before you on this subject of dairy inspection, and it is satisfactory that we have had an opportunity of having it ventilated. You have heard Mr. Pound on his scientific experience as regards breeding cattle from beasts that are diseased. I would like to give you a little of my experience, and show you the danger of breeding from anything that is diseased. When I was a lad I remember my father buying a bull at a high price who turned out to have actinomycosis, or mumps, on his throat. We let the matter out of the affected part and bred from the bull. A great proportion of that bull's stock all developed actinomycosis, which shows the danger of breeding from an animal affected with anything of that sort. The matter of milk affecting the calves was referred to. I have noticed in the case of actinomycosis-affected cows that the calves they have reared, developed the same complaint. I have not had much experience with the tuberculin test, but I have read a good deal about it. and it appears we ought to be very careful in destroying beasts that react to the tuberculin test. I have read that it has not always been correct, and that a *post-mortem* does not always bear out the indications of a tuberculin test. As regards pleuro-pneumonia and tuberculosis, I have noticed that their presence amongst cattle depends a good deal upon the nature of the country they are in. A speaker stated that there was not much tuberculosis in the far West, but a little practical experience makes me differ from him. In the far West, where there is sandy soil, such as is on the head of the Warrego, there is little or no disease. But on the Barcoo, where it is black soil country, there was a good deal of disease—more disease, both of tuberculosis and pleuro-pneumonia, than I have had in all my herds of cattle. I have noticed on our run in the Kennedy there was one plain of black soil, and on that plain we often get beasts affected with pleuro-pneumonia. It is, moreover, the only place on the run where the pleuro seems to develop. I think that the lying of the cattle on the damp black soil is the cause. At any rate, that is the only way I can account for it. We had the same experience on the damp black soils of the Barcoo.

Mr. R. C. LETHBRIDGE (Maranoa): I think it is only right that men with practical experience should give their views on this question. I have had considerable experience with cattle, and may tell you that some years ago I purchased two bulls from out West. One of these bulls was affected with a lump in the throat—actinomycosis. That bull ran on a particular part of the run, and I noticed afterwards that

the great proportion of his stock were affected with the same disease. The first time I ever knew this disease of lump in the throat was in Victoria. To the estate I was on, the manager brought a bull from Twofold Bay, which was then a celebrated herd. A great number of that bull's stock had lump in the throat. So I have always considered it was hereditary, although, of course, we bow to the opinion of scientific men. I think Mr. Pound would tell us that, although it may not be hereditary, yet the stock bred from an affected beast would be predisposed to that disease. With regard to horses, I know of one case where the stock of a particular mare were all affected with fistula. It seemed to come naturally. They all used to get the disease, and finally I had to destroy them altogether. We ought to be very careful what stock we breed from, and I think if tuberculosis or actinomycosis shows in a cow, she ought to be destroyed at once.

Mr. J. McPherson (Rockhampton): I am one of those who hold that scientific men are very good sometimes, but I think practical experience of a number of years is very much better in many cases. I have had a good deal of experience, extending over very many years, with regard to lumps in the throat. I knew a squatter, who, twenty years ago, got a very valuable bull which cost him £1,000. About twelve months afterwards, he developed lump in the throat. The squatter had some stud cows, and he kept the young bulls from those cows. The consequence is there are now more lumps in that station than in any other in that district. I have seen two hundred cows put in a paddock for the purpose of being sent away to the boiling-down works with lumps, and those lumps owed their origin to the bull I have referred to. I would advise every man with a lumpy bull to shoot him. I am certain that it is hereditary. I have had it amongst my own stock. I once bought a bull with lumps, and his stock developed the same disease.

Mr. T. Burgess (Forest Hill): I have not come here with any intention of trying to give information. On the contrary, I have come to find out certain information. There is one aspect of this question that has not been touched upon by any of the previous speakers, and that is, What effect has diseased milk on the human system? Our family has always been fond of milk. We live in a country district, and, until very recently, I had never heard of tuberculosis. I had never heard of the tuberculin test. We knew nothing of these diseases that we now hear so much about. We were all fond of milk; we drank it hot and we drank it cold from as long as I can remember. We have all grown up, but I do not think any of us have ever shown any symptoms of internal disease. I was lately speaking to a doctor, and he assured me that medical science had found out no less than 2,000 diseases during the last few years that were dangerous to the human system. We all know the value of milk on small farms. We know if we do not give calves new milk that they will not thrive. So I want to know whether in drinking this milk from our cows that have never been subjected to any examination, and that are running in our pastures, we are running any danger. I like milk, but if I hear much more about its danger I shall be swearing off.

Mr. P. Biddles (Tiaro): It has come to my mind that about fifteen years ago, when pleuro was very prevalent, a lot of us started to inoculate. There were two in my district who were very particular in this matter, and I think they inoculated from between 16,000 to 20,000 cattle. At present those two gentlemen have found that they have ruined the constitution of their herds. The constitution of their herds is not equal to those whose owners did not inoculate. I do not know whether the tuberculin test would have the same effect as that, but it is a question that wants looking into as far as cattle-breeders are concerned.

The Hon. D. H. Dalrymple: Mr. Burgess has put me a question. I do not know whether he intended me to answer it, or whether he looked upon me merely as a channel. However, I shall endeavour to give my opinion upon the matter, and Mr. Pound is here to check me. It was asked what effect was produced upon human beings, or calves, or pigs, or other organic creatures if they drank

milk from cows which were suffering from tuberculosis. Mr. Burgess remembered drinking milk from a very early stage of his existence, and I presume he referred to the milk of the cow. In the course of his whole life, if there had been so much tuberculosis prevalent, it would be a most extraordinary thing if he had not, at one time or another, been subject to the influence of tuberculosis in cattle. I think I am right in assuming that unless an animal has tuberculosis locally under certain conditions, either in the milk glands, which secrete, I presume, diseased milk, or mechanically on the udder itself, where the bacilli of the tuberculosis can be mechanically brought into the milk—except, I say, under those two conditions, the milk of a tuberculous cow will not affect those who drink it. And there is another matter which we must always consider in cases of disease—that is to say, disease is, after all, the result of several causes. First of all, there is the disease, there is the vehicle to the disease, and there is the patient. The person may suffer or may not. That will depend on his constitution. For instance, during the whole of our lives we have always been running risks of having various diseases There are very few who have not seen people of their acquaintance suffering from those diseases which are deemed to be contagious. It is not sufficient to have contagion, however. You must have a subject predisposed to that contagion. It might happen that I might drink milk which contained diseased matter, and I might not contract disease. But it would not at all follow that I had not run the risk, and there it lies with regard to diseased milk generally. If a person takes milk or any other fluid which contains the germs of disease, there is always a certain amount of risk. That risk may be a serious danger, or it may, in the case of an individual who possesses a constitution which will throw off the disease, be infinitesimal. Nothing is more clear, therefore, that we should diminish, so far as we can, the risks that everybody runs, and in the case of a diseased cow, I do not think a properly constituted dairyman or citizen would employ such an animal. But it is quite evident that any endeavour which is made by individuals or by State action to stamp out a disease like tuberculosis, which, however you may be disposed to limit its danger, is nevertheless risky both to the rest of your stock and to the human being, is a perfectly legitimate endeavour which ought to receive universal support. First of all, I say, by all means lessen the risk of these diseases and increase the safety of human life, and, secondly, save the risk of financial loss among the community. I hope that anything that is proposed in this way, either by voluntary co-operation on the part of the farmers or by Government action, will receive the support of those agriculturists who are directly interested. As for risks: We have all been running risks, and possibly too much may be made of risks which are believed to be new, because they have a new name. Since the time of Adam, diseases have been present, and human society and animal society have still managed to work through. At the smoke concert this evening, I now find that Mr. Pound has kindly arranged to give a lecture, illustrated by lantern slides, and, although he may demonstrate a great many things we did not know before, we will not run any greater risk of certain diseases because we know more about them, and certainly if we have more knowledge with regard to them we shall be able to deal with them better, for we shall be more masters of them. They have always existed. If you go to the smoke concert and see some of the horrors which I have seen Mr. Pound cast upon the stage, perhaps the enjoyment of the concert by some of you may be absolutely destroyed. But, in order to fortify the hearts of my friends here, I will say that, whatever things Mr. Pound may depict, they are things which man has been subject to since Adam, and which all previous generations have up to the present tolerably safely negotiated.

Mr. J. E. DEAN (Maryborough): I am glad to say that the paper I read had the effect I desired it should have, and that was to bring about a discussion. There are several things in that paper which Mr. Pound bears out, but I think that Mr. Maynard made a mistake when he said that I inferred that all milk is safe to use. I did nothing of the kind; or else why did I say

that veterinary surgeons ought to go round through the herds and select out every apparently diseased animal, and have it destroyed or removed with a view to treatment for its recovery? From that I conclude most certainly that I meant to say that it was not safe to have that animal in the herd. That is my opinion; and I said at the last Conference that every owner for his own sake ought to destroy diseased animals. I must say that Mr. Pound has altered his opinion, an assertion that I base upon his article in the *Agricultural Journal* two months ago. I may say that I have read every article which Mr. Pound has printed. Not only has Mr. Pound altered his opinion, but one of the leading bacteriological authorities of America has taken the same stand. I think that I base my statements upon the practical results of my own observations. Mr. Pound speaks of the cost of tuberculin, but I based my remarks upon the fact that I had to pay 6d. per dose, and on the fact that I was told that whether one dose or fifty it was 6d. for each. We appear to be able to get it cheaper now. I do not wish to deny that if a cow's udder is affected with tuberculosis its milk is unsafe to use. That milk is not safe to use; but how are we to know whether the animal is affected with tuberculosis of the udder? If we apply the tuberculin test the cow may react, but how are we to distinguish where the tuberculosis is located? Every class of animal and bird is affected with tuberculosis more or less. Now that Mr. Pound is present, I would like to make a statement in connection with the tuberculin test. He may no doubt take the opportunity of refuting it. In the manufacture of tuberculin, it is stated that nothing is introduced whereby any disease can be transmitted into the animal into which it is injected. I may say, however, that I applied that test to six head of calves between the ages of ten months and fifteen months. One of them was a pure-bred Jersey bull, which I intended to breed from. The operation was carried out in the presence of the slaughtering inspector from Maryborough, and there was no reaction. Some six or seven months afterwards that bull developed a lump. The lump grew to over 1 lb. in weight, and, being accordingly afraid to breed from the animal, I destroyed him. I got out the lump, and found inside yellow grains, from which was oozing yellow matter. Mr. Pound may be able to tell me what that was.

Mr. C. J. Pound: Neither I, nor anybody else, could tell without an examination.

Mr. Dean: The heifers also developed lumps on the jaw—actinomycosis. I have been breeding cattle in Maryborough for a number of years, and can tell you that I have never had any case of lump under the jaw, excepting in this instance. What am I to infer? Mr. Pound says the tuberculin is guaranteed absolutely pure, and cannot convey disease, but it certainly seems that by injecting this poison into our herds we are certainly running a certain amount of danger. Tuberculosis, scientists tell us, is not hereditary. Actinomycosis, practical results tell us, is. Some people confound the two, but they are entirely distinct. In this matter of testing, should we not be consistent, and see that every mother is tested? If the milk from a cow will convey tuberculosis to its own calf, are we not justified in coming to the other conclusion, and say that the milk of a tuberculous mother will give the same disease to the child. During my life I have spent twenty years in this country in dairying, and I also followed it up in the old country. During that time I have always remembered a statement once made to me by my mother—and one which my experience has borne out—that she had found during her life that those people who systematically and regularly used the largest quantity of milk maintained or enjoyed the best state of health and were the freest from disease. One doctor in England takes this stand. He says in effect—"In every case of consumption which I have taken in its early stages, and where it has been practicable to follow my instructions, I have sent that person close to some dairy, and they have been instructed to get at least daily one pint of milk from the cow the moment it is taken from her, and I have never known a case to fail to recover." That is a practical result. I think we are quite

justified, as sensible men, on relying on our own practical experience. I understand science to be knowledge. If it is not knowledge, it is theory, and practice will not bear it out. I may say, further, that I feed my pigs continuously on milk, and I have never had a case of tuberculosis in animals of my own breeding. I remember, however, buying half-a-dozen pigs which had not been fed with milk in the early stages of their growth. Four out of these were condemned for disease.

CATTLE QUARANTINE LINES AND REGULATIONS.

Mr. J. McPHERSON (Rockhampton): The subject of tick quarantine lines is a very important one, and, doubtless, many of the delegates came here to hear it discussed. With your permission, I would like to say a few words upon it. The cattle industry is a very important one, and there is no doubt that the present quarantine regulations have interfered with it very much. I can give you one or two instances as far as the Central district is concerned. At Lake's Creek there is a very large and important meat manufacturing establishment, as all of you are doubtless aware, and a good many cattle are killed there, provided the management can get them. At the present time the quarantine line prevents them from getting cattle from the north-west portion of the State. It is too far to drive them from that part to Lake's Creek. Longreach is the terminus of our Central Railway, and, provided the owners of the cattle could get them to Longreach, they could truck them to Rockhampton. But Longreach is some 4 miles or 5 miles to the south of the present quarantine line. The cattle can come within 4 miles or 5 miles of the terminus of a railway 427 miles away from the desired destination, but no further. To drive them, a distance of between 400 miles and 500 miles would have to be traversed. The other day two mobs of cattle started from the south of the quarantine line. One lot was travelling to Brisbane and the other lot was travelling for sale, it being intended, with regard to the latter lot, if they could not be sold in Brisbane, to send them on to New South Wales. During the march, word came back to the second lot that ticks were ahead. The first mob that was intended to be fattened on the Brisbane River was allowed to go on, but the other mob had to be turned back and sent round a circuitous route of an extra 200 miles. As far as I can see, and I have contended so for a long time, New South Wales dominates the position. They have done so from the start. I do not think Queensland should submit to that, and I contend it would make no difference, or very little difference, if they did close the border entirely. They have not a supply of cattle for their own requirements, or anything near it, and if they would not allow our cattle to go in by road, they would have to get them in by sea in the shape of chilled meat. We should not submit to these quarantine regulations and vexatious interferences imposed upon us by another State. The time has arrived when Queensland should assert herself and tell New South Wales she is not to be dictated to. If New South Wales wants a buffer area, let her have it on her own territory. I contend that by dipping cattle they can travel safely. If we have dips at intervals of seven days, there is not the least danger of the cattle carrying ticks. I am satisfied that dipping kills ticks. The dip that I use consists of 2 lb. of arsenic, 4 lb. of soda, and 100 gallons of water. If you make it make it stronger it is likely to have an ill effect on the younger cattle. If you make it up to 3 lb. of arsenic it cracks the skin on the cattle, but 2 lb. will clear any ticks I have just opened the question for the purpose of creating a discussion. Unfortunately, Mr. R. S. Archer, who was to have introduced this matter, and who would have laid it more ably before you than I have, was unable to attend the Conference. The other representative of the Central Queensland Stockowners' Association, Mr. T. S. Huggins, has also been called away to Brisbane. I have used Stockholm tar for ticks, but gave it up. One application of the dip I have already mentioned will destroy ticks. Three days after the operation you will find dead ticks on the animal, but to be perfectly safe I would dip at intervals of seven days.

Mr. T. de M. Murray-Prior (Maroon): I would like to say a few words on this matter, for it is one I have always taken a deep interest in, and one from which I have severely suffered. From the first, the regulations and their administration by the Department have not been for the good of Queensland as a whole. Some have suffered for the benefit of others. I think it was Sir Horace Tozer who first instituted this business, and from that time the Government does not appear to have properly considered the people of Queensland, nor have the tick regulations been carried out as they should have been. There has been favouritism for some, and very hard usage for others. I do not intend to speak at length on this matter, for I do not wish to spoil the harmony of the splendid gathering that we have here, but I wish to point out a few facts that have come within my own knowledge. In the first instance the quarantine lines were struck, at the instigation of New South Wales, without regard to the distance of certain people from ticks. Through that, on my late father's station we lost at least £8,000 or £9,000, which could have been saved without the slightest danger to the State, because that run is still quite clear of ticks, and the road from it to New South Wales is also quite clear. I am only mentioning this case to show how hardly it bears on some. I have a run in Western Queensland, from which we are free to go to New South Wales, and only recently I made a good sale for a small quantity of stock from it to go to that State. On that Western run we have lost, through drought and other causes, half our stock, and, unless we can get cattle across from our Northern run where we have the stock, we shall have to forfeit a good deal of the Western country. We are quite clear of ticks in either case, so you can see the hardship that is inflicted by not being allowed to take stock from one of the runs to the other, and thereby make use of land which otherwise would be idle. Mr. McPherson has shown that we can travel stock without any danger, by dipping. I have advocated that the Government have dips on the different main routes in which travelling stock could be dipped, and I maintain if stock are dipped carefully, say twice or perhaps three times, that they can travel throughont Queensland without danger of spreading the disease. From conversations I have had with Mr. Bruce, the Chief Inspector of Stock of New South Wales, I think if he saw that our Government were carrying out such a measure properly and carefully, and there was little or no danger, that a great portion of our border, which is now closed, would be opened. If a dip were placed on the buffer area, which has been so long established for the Darling Downs, and there were another near the border, stock could be allowed with safety to travel into New South Wales, and I think this meeting should give it as their opinion that stock should be allowed to travel throughout Queensland if a proper system of dipping were introduced.

In reply to a question, Mr. Prior further stated: Sandy and limestone country is not adapted to ticks in my opinion. The run, which I referred to as being quarantined in the early days of the tick trouble, was not then attacked by ticks, and it is still free from them. There is a run—namely, Oakleigh—next to the run I was referring to, to which ticks were brought by cattle coming from Lammermoor. They very soon, however, disappeared, thus showing clearly that the country there is not adapted to the tick.

Mr. J. H. Maynard (Gympie): Both Mr. McPherson and Mr. Murray-Prior have spoken from the grazier's point of view on this question of quarantine lines. I will give you an instance of the way it affects dairymen. Those who were down at the late Brisbane Exhibition will remember that some very good dairy cattle were offered for sale, but that practically none were sold Of all the St. Helena cattle, only one bull and one heifer were disposed of. I myself had some bulls for sale, and I presume the shoe pinched me no more than it did a number of others. Mr. McLeod, of Fenwick and Co., told me there were plenty of buyers on the rails, but that a beast could not be taken to the south of the Brisbane River or to the Darling Downs on any condition whatever. The market for pure-bred dairy cattle was evidently stocked for other parts, but there was a good demand on the Downs and on the Logan. Yet we

could not get a single beast there. I do not see why we should suffer for the benefit of New South Wales, and if that State wants a buffer area she should have it in her own territory. Knowledge increases, and since the quarantine lines have started we have learned a good deal about dipping. We now know that dipping is effective, and if the Government let stock, properly dipped, pass over the quarantine line I do not think that anyone will suffer, and that the State generally will gain.

Mr. R. C. LETHBRIDGE (Mitchell): With reference to the difficulty mentioned by Mr. McPherson of getting cattle to Lake's Creek, I would like to mention that some twelve or eighteen months ago a meeting of stockowners was held at Mitchell, in the Western district. We recommended that the tick line up to then should be altered. At present it runs through a number of cattle stations that are infected, and there is absolutely nothing to prevent cattle going from one run to another. We recommended a line commencing on the Central Railway until it got to some rabbit fence near Barcaldine, and then to follow that rabbit fence to the South Australian border. We thought that it would be a much safer line than the present, as we knew ticks were south of the northern quarantine line. We sent this line down to the Central Board of Advice, and were told that nothing could be done with regard to it. I do not think we shall get much satisfaction out of the New South Wales Government in this matter until the people of that State move in it for their own interests.

The Hon. D. H. DALRYMPLE: I am not desirous of taking up much time myself, but I think it would be fair to point out that the tick lines, as they exist, have not been laid down or arranged for the benefit of New South Wales. New South Wales as a purchaser, however, is in this position, and her people, as controllers of their own State, can say there are certain conditions which we lay down and which must be complied with, or otherwise we close our borders. Mr. Bruce, of New South Wales, and Mr. Gordon have arranged certain boundaries which, if they were observed by Queensland, would be regarded as a sufficient protection, and the New South Wales border would be opened; and it was for the benefit, not of New South Wales, but for the benefit of Queensland cattle-owners, who considered it was desirable that they should have New South Wales for a market, that this was done. I merely state this to show there was no carelessness. But it is quite evident that to keep open the trade between New South Wales and a large portion of Queensland which was not affected, would be distinctly beneficial to all cattle-owners who resided in that portion. If, for instance, a third of the owners could have access to the New South Wales markets, it was the duty of whoever was responsible to endeavour to secure for that one-third of the people of the State the right to travel their stock to where they could obtain a good price for them That was the object in view, and any agreement which was made by Mr. Gordon and Mr. Bruce was made to minimise the loss which was inevitable to the people of Queensland. We all know it is an infliction to prevent stock travelling at all, but in order to prevent a larger evil it was considered advisable to make quarantine lines. The object certainly has been to do as much good as possible. A gentleman now wishes, if the discussion has terminated, to submit a resolution which is of a formal nature. I shall accordingly permit him to do so.

Mr. J. MCPHERSON (Rockhampton) then moved that the following be submitted to the Committee of Resolutions :—

"That stock should be allowed to cross the present quarantine line after taking proper precautions by dipping to prevent ticks being carried, and that if New South Wales wants an absolute buffer area they should establish the same in their own territory."

The motion was agreed to.

The following two papers were then read by Mr. T. E. Coulson, of Rosewood:—

INJURIOUS EFFECTS OF SORGHUM ON STOCK.

My object in bringing this matter under the notice of this Conference is to try and cause some light to be thrown on the injurious effect of sorghum on dairy stock. In the district I have the honour to represent as one of the delegates at this Conference, dairying is extensively carried on, and it is very necessary, in order to do so successfully, that winter feed should be provided. Now, the crop that will give the greatest bulk and remain in the green state the longest is undoubtedly sorghum, especially on the highlands, where it is not injured by frost. But since the last few years, many dairy farmers, especially in the Rosewood district, have suffered very severely by its effects, sometimes through accident, owing to the cattle breaking into sorghum paddocks from which the crop has been taken off. The worst case that has come to my knowledge was that of a poor widow woman who had a little herd of seventeen cows and a bull, all of which, with the exception of one cow, died from eating sorghum. Some people run their cattle, as I do myself, on sorghum, in all stages of its growth, without losing one beast. It has been stated by some that sorghum, where subjected to frost, is fatal to stock, while others are of opinion that it is after rain that a fungus forms on the young shoots. I think there is something in this last theory, as one man I know lost eleven cows last year when the shoots were not more than 1 inch long, and these cattle were not in the field more than one hour before they were seriously affected. The experiences of the people who have suffered are by no means alike—indeed, they are very conflicting. In some cases the cattle are only slightly moved, but all are very unanimous in the opinion that they are killed much quicker than if strychnine had been administered to them. Now, from what I have said, I think it will be agreed that the time has arrived when, in the interests of the dairying industry and in the interests of the State, the Government should turn its attention to this matter, and exhaust every means in its power to set at rest, once and for all, the question whether there is any effective remedy for sorghum-poisoning. The various bush remedies that we use, such as baking soda, turpentine, with a tincture of kerosene, are of no avail. In conclusion, permit me to suggest that the Government experiment with sorghum in all stages of its growth on some old culls, say, at the Gatton Agricultural College, where there is a staff capable of treating the animals in scientific manner. The result of such experiments would be awaited with eager interest by all who make their livelihood by dairy farming.

SWINE FEVER.

This, like my former paper, is a subject of vital importance to my district, where something like 1,000 pigs per month are trucked to the bacon factories. It is then imperative that we should be in a position to cope with every disease the pig is subject to. Swine fever or pants is a disease which was unknown in the Rosewood district, so far as I am aware, until the last year or two. I noticed about two years ago, through the medium of the *Queensland Agricultural Journal*, that something like an epidemic of the disease broke out in the Mackay district. My only object, therefore, in introducing the subject is to try and elicit the information from those farmers who had to cope with the disease whether they could combat it in an effective way. In my district, where the pigs were affected, it resulted in the loss of about 80 per cent. The scourge seems only to affect pigs of the ages of from one to five months. In some cases death will ensue in from three to four days after they are smitten down, as they do not care to rise for their food. They are often found lying dead about the paddock where they have been running. I also noticed that the fever affects them only in the hotter months of the year, from October to March. I make these short remarks in the hope, as I said before, that some light may be thrown on the subject by members of the Conference who have had experience with the disease.

Mr. R. H. Cox (Gympie): In the early part of this year there were a number of cases of sorghum poisoning in our district, and the day before yesterday I received a newspaper cutting from a farmer, with a request that I read it to the Conference. With your permission I shall do so, as follows:—

SORGHUM POISONING.

Six More Cattle Dead.

Another case of the fatal effects of sorghum at times on cattle followed quickly on the one given in Tuesday's issue, the loser this time being Mr. A. G. Ramsey, South Side. On Thursday morning his dairy herd, numbering over thirty cows,

gained admittance to a patch of sorghum through the bull knocking down the fence. The sorghum, which had made a very slow growth owing to the dry weather, was only about a foot in height, and while the cattle were in the patch, a matter of some twenty minutes, they only ate about enough to make a decent day's feed for one cow. Yet, when the animals were hunted out, it was noticed that some had a groggy look about them, and, before many minutes had elapsed, a couple had fallen to the ground, and appeared to be suffering great pain. A number of other cows seemed to be affected, but not all were seized alike. Some were dazed as if drunk, and unable to move or keep their heads up, while others appeared to be mad, quiet animals charging their attendants, and goring the cows which had fallen to the ground, then themselves tumbling over a few minutes afterwards.

Naturally, every means was tried to save the cows, but no method was hit upon which would seem to be successful in combating this rapid poison, which at times forms in the various sorghum growths. Tapping was resorted to where the animals showed any signs of being "blown," but this did not seem to give much relief. The first animal to succumb was a cow, which did not show any signs of being "blown," nor was she swollen, yet she died within three-quarters of an hour of being taken out of the sorghum, and within another half-hour the body was greatly swollen.

Some animals which showed slight signs of being "blown" or "hoven," were tapped, and the gas let out, but there was very little to let out. They were also dosed with spirits, with castor-oil, with spirits of turpentine and egg, but of none could it be said that a certain remedy had been found. A cow dosed with rum and castor-oil got very bad, but recovered, and is now walking about. Altogether six cows died, all valuable milkers, and one is still unable to get up, whilst only three that were badly attacked managed to recover.

The lesson to be learnt from this is one that dairymen should take to heart. It would appear that at certain times, or under certain conditions, sorghum develops a deadly poison, which has so far defied analytical chemistry, and great care should be exercised in feeding it in a green state.

DISCUSSION.

Mr. P. BIDDLES (Tiaro): I have had a little experience on this subject, as I grow a number of the sorghums. It has the same effect on horses as on cows, but I have never known it to affect cattle after the seed has changed colour. It is always dangerous, however, when it is in its young stage. I had a lot of bucket calves knocking about, and one morning we found three or four dead. Naturally, some people said blackleg, but about two days afterwards I saw some of the remainder had got into the young sorghum. The next evening two were dead, and we immediately knew what had killed the others. It must be some gas, or something that creates a poison in the blood. That is my opinion, for, as Mr. Coulson said, some of the cattle are not in the slightest way different when they fall dead to what they were when they were walking about. It has the same effect on horses, although they do not die as easily as cattle.

Mr. J. H. MAYNARD (Gympie): In the Gympie district, as Mr. Cox has read, we have been suffering from the poisonous effect of young sorghum. In all cases it has been young, and from what I can read they have been suffering in the same way in America. But in America the evidence seems to show that the second growth is more fatal than the first. After the first losses in the Gympie district, the Central Farmers' Association asked for an expert to be sent up. There was no officer available at the time, but three weeks afterwards Mr. Tucker arrived. I went round with Mr. Tucker and interviewed the gentleman who had lost cattle. It was suggested that it was a narcotic poison, and the remedies recommended were spirits and soda. Of course soda is good for hoven, and spirit is a reviver. Rum appears to be very good. A gentleman I know turned some cattle on to a patch of Johnston grass about January. A shower of rain had put a short, quick growth into the Johnston grass, and, within twenty minutes, a couple of the animals were down. His boy immediately turned the whole lot out of the patch, but everyone that went down, died. I want to take this opportunity to warn every gentleman here against ever putting Johnston grass into his land. Johnston grass runs its roots 3 feet into the soil. You cannot plough out the roots. It also spreads from seed like ordinary sorghum. Seedsmen who

advertise Johnston grass as a splendid drought-resisting fodder ought to be prosecuted for false pretences. It will not grow in dry weather unless you cultivate it, but after having once cultivated it you cannot get rid of it. I consider it worse than nutgrass.

Mr. A. MOFFAT (Radford): There is no subject that I have listened to, and none that interests me and the farming community of Queensland more than this subject which has been dealt with by Mr. Coulson. We cannot ever expect to establish the dairying industry upon a firm basis unless we can provide for our stock for four months of the year. The difficulties appear to be as though they could not be overcome. It is not only sorghum, but all other fodders that we may use are liable to have a similar effect to one referred to by the writer of the paper. There is the same trouble with lucerne. I had a fine calf the other day that died through eating a green pumpkin. It is the same with barley. If you have a flush growth of barley you can hoven your cattle in that way. I lost a valuable bull over barley last year. This providing of winter feed is a most difficult matter, and a harder one to solve has not come under my notice. I have started dairying lately, and it is this trouble more than any other that keeps me awake at night.

Mr. J. W. LEE (Zillmere): I have grown sorghum for many years, and I think the great mistake is made in using sorghum at the wrong period of its growth. I have read of many instances of cows being killed, but in every one it appears that the cows got on to the sorghum in the young stages of its growth. I never feed my cattle on sorghum until I see the bud out on the top, and I have never had the slightest difficulty with any of my cattle when I fed them on sorghum, or imphee, or millet. In the days of the old East Moreton Farmers' Association this question came up even then, and I remember a selector at Mount Cotton who had four cows killed from this cause. The cattle, in his instance, had been turned in on to young sorghum before it had arrived at its proper stage of maturity. I believe when that stage takes place the poisonous effect has gone out of the plant. It is the same with corn. My cattle will not eat corn until it comes somewhere near its head, when there seems to be a thorough change in the nature of the cereal.

Mr. W. DEACON (Allora): I have used sorghum for a great many years, and have never had a cow or calf blown or poisoned. I have used it at all stages except, of course, at the 6-inch stage. I like it to be at least about 2 feet high. I remember we had a 4-acre paddock from which it would not pay us to cut and cart the sorghum. We therefore turned the stock into it. It was about 1 foot high, and we let them eat it down. No injurious effects arose. As far as I can understand, the trouble seems to arise from hoven.

VOICES: No.

Mr. DEACON: We have much the same trouble with lucerne.

Mr. COULSON: A different thing altogether.

Mr. DEACON: Lucerne ferments, and barley will do the same. I have known cows turned into barley when it was about 8 inches high. If I have any cows coming out of young barley, and there is a chance of their being blown, I send them into the stockyard and see that they get no water. It is a strange thing, but if cows have had a lot of green stuff they run for water. I think it is the water that causes the trouble, and I never let them have any on these occasions. A fortnight ago a number of my cows got on to some green stuff, and, as I was away at the time, they afterwards managed to get some water. As a result there was one calf that could scarcely stand. Of course we simply stuck it at once, and it soon got all right. You can generally save them by sticking.

Mr. J. E. DEAN (Maryborough): I may say that I have fed sorghum in all its stages to cattle, and have never had any trouble with it. I have never fed it to them whole, however, but have always put it through the chaffcutter. One of my neighbours took some sorghum when it was about 18 inches high, and fed it to two cows. In about an hour one was dead. I fed some sorghum

of exactly the same height and growth to my cows with no ill effects, the difference being that mine was put through the chaffcutter and his was not.

VOICE: Did you put anything with it?

Mr. DEAN: There was certainly a little bran. In cases of hoven I always believe in tapping, and I would advise everyone not to be afraid to use the knife. I have seen cases so bad that the animal was actually panting for breath owing to the pressure on the lungs. The putting in of the knife, however, generally gives immediate relief.

Mr. M. L. GATAKER (Nikenbah): I have read a lot in the *Agricultural Journal* about sorghum poisoning, but so far I have not had any trouble in that direction myself. I cut the sorghum at night, and chaff it for use the next morning. I have never fed sorghum to my cattle whole, and have now been using it five years without any ill effect. If an occasion arises when I am short of feed I generally mix some dry oaten chaff with the sorghum. Sorghum is indispensable to me in the feeding of my stock, and I think I have used them all—sorghum, imphee, amber cane, kafir corn, &c.

Mr. J. DANIEL (Pittsworth): With reference to the Johnston grass, I would like to ask Mr. Coulson if he has ever known cases where the Johnston grass has been the means of the death of cattle or horses. At one time my brother induced me to scatter a few seeds of Johnston grass, and by so doing I may say that I managed to spoil a beautiful farm of about 40 acres, which is now all eaten up with Johnston grass.

Mr. T. E. COULSON (Rosewood): I do not wish to monopolise the time, but would like to read two little extracts from a Southern journal which have been sent to me since it was known I was reading a paper on this subject of sorghum poisoning:—

SORGHUM AS A SOILING CROP.

E. E. CHESTER, Illinois.

Blue grass, timothy, and the clovers are pre-eminently the pasture grasses of the cultivated region of this north temperate zone. They, like all other forage plants, are so subject to change from a normal growth in extremes of temperature, humidity, and varied fertility of soil that with large experience and without prophetic knowledge it is not an easy task to gauge the area of pasturage to the number and demands of live stock on hand. The clovers are often damaged if not killed outright in winter, and when the thermometer registers for weeks at a time near the 100 mark, and the heavens are as brass, refusing the much-needed rain to the parched and thirsty earth, the grasses insist on taking a vacation and give themselves over to perfect rest.

For this latter misfortune the sorghum plant is a godsend to our country, fitting the emergency nicely. It is a child of the sun transplanted to and acclimated in our colder climate. It revels in the heat that withers the grasses, and ignores the lack of moisture that compels their repose. In three years out of four the pasture crop is shortened some time during the month of August, or possibly a little sooner or a little later. The latter end of this drought is where the pinch comes to stockmen. Sorghum may be planted early as corn-planting time to meet the early drought, but if planted early it should be in rows adapted to cultivation, for it grows slowly until the days and nights are warm, and the weeds will push it hard if sown early and not cultivated. The largest crop may be grown on land fall-ploughed, or ploughed early in spring, and thoroughly cultivated until late corn-planting time. The soil should be strong, well pulverised, and free from weeds, as it will be if disked or harrowed often up to this date. It may be put in with a wheat drill with alternate holes stopped. It may be sown broadcast and harrowed in if the ground is moist at the time. Most of our farmers put it in with a corn-planter, double-rowing it. In either method from 3 pecks to 1 bushel per acre of seed is used. If to be cut with the binder for hay, a trifle more may be used. When put in as directed, there is little fear of weeds injuring the crop, as it grows rapidly when there is heat enough to make it think of the homeland.

When planted in rows, it is usually cut with a corn knife and hauled out daily on the pasture land for the cattle. If it is sown broadcast it is cut with a mowing machine as wanted for use. All live stock, and even the average boy who has a knife with which to remove the outer shell, is fond of it, and, so far as my personal knowledge goes, no harm has come from its use, not even in a frosted stage. Yet in Kansas they say cattle die from the effects of second growth frosted sorghum. I know of a bunch of Jersey cows that have been pastured for the past month in a field

where there is a large second growth of this plant. Last year, on the same farm, cows filled themselves daily for weeks on sorghum after it had been frozen, without any ill-effects. My neighbour, who sells milk, plants each year sorghum to help out his pastures in a dry time and says, "There is nothing like it for increasing the flow of milk." Another makes butter and grows sorghum in abundance for his cows and as a soiling plant for his calves and yearling heifers, and says, "It increases the butter yield, and is cheaper than pasture for growing young stock." Another grows it for feeding cattle for the block, giving them a noon feed of sorghum, and says, "I get profitable results and shall continue its use."

Twenty tons of green sorghum per acre is not an unusual yield, and as an emergency plant to insure against drought (or if the necessity for its use does not come, as this year with us, cut and shocked like corn it is a good winter feed) we think it is worthy of a prominent place in the list of farm crops.

LOSS OF DAIRY STOCK.

Some time ago I wrote you *re* loss of dairy stock at Mr. P. O'Donnell's farm, and mentioned that, besides the cows which succumbed to the effects of the sorghum, it was thought probable that a number of others would follow suit. I have since learned that the latter cows were successfully treated by Mr. A. Rodgers, of Lanefield, who used a mixture which he had proved to be beneficial in similar cases. I asked Mr. Rodgers to kindly forward the recipe for publication, and this he has willingly done. He states that it will not fail if administered in time, and he has known cows to recover when their case seemed hopeless. The cure is as follows:—Quantity sufficient for one beast: one small bottle of castor oil, one ounce soap, one tablespoonful ground ginger, one tablespoonful of turpentine, one tablespoonful of kerosene, one dessert-spoonful of Stockholm tar, and half-an-ounce of baking soda. Dissolve these ingredients thoroughly in $1\frac{1}{2}$ pints of hot water, and give to the affected beast through the nostrils as hot as can be borne. A pint of warm water may afterwards be given to thoroughly cleanse the throat. No cold drink must be allowed as long as the animal appears to suffer, but warm water mixed with a little bran may be given.

I just read the last extract in order to take the opportunity of warning you that I think the remedy there described cannot be depended upon as being a good one for sorghum poisoning, for I know for a fact that it was used by Mr. Bassett with unsuccessful results. With regard to the first growth of sorghum, I may tell you this: I have put cattle on to the first growth of sorghum without ever losing a beast.

A VOICE: What kind of season?

MR. COULSON: A dry season. Mr. Maynard says deaths have occurred from eating young Johnston grass, and I may say that in our district it does not take any more Johnston grass to kill a beast than sorghum. Mr. Lee does not feed his cattle on young sorghum; but when you have no grass, hungry cattle, and a nice patch of young sorghum, the latter looks very enticing. The blowing caused by eating young barley has been mentioned, but that is neither uncommon nor mysterious. Some of us have turned cattle into paddocks after a crop of corn when there has been a lot of young luxuriant growth. Cows will even get blown on that. Mr. Dean said he chaffed his sorghum, but in our district we do not usually chaff. Some of us feed between sixty and seventy cows, and to chaff for them would mean rather a lot of work. Mr. Gataker mixed his sorghum with oaten hay, and perhaps that assisted to destroy any poisonous principle that may have been in the former. Opinions are divided as to what kind of fodder sorghum makes, but I may tell you that at the last three Rosewood shows I have exhibited butter, and I have secured first honours. This butter was made by my girls from milk obtained from cows fed chiefly on sorghum. I thank the audience for the kind manner in which they received my paper, and finally hope that in the interests of the dairying industry the experiments I have suggested will be carried out by the Agricultural Department.

The Hon. D. H. DALRYMPLE: We have in our midst a gentleman of great experience and scientific knowledge. This subject is very far removed from politics, and you will doubtless be glad to hear whether Dr. Maxwell has formed any opinion upon it. I shall, therefore, ask the Doctor if he will give us the benefit of his experience.

Dr. MAXWELL (Director of the Bureau of Sugar Experiment Stations): I am interested in this subject, and shall tell you specifically why. When I was a chemist working in the laboratory of the Agricultural Institution in Switzerland, a similar question came up, and that was with regard to the use of cotton-seed meal in the feeding of cattle. It was found that young cattle were affected by the use of cotton-seed meal or cake. When I was on my father's farm in England, I had charge of the feeding of the cattle, and when I became a chemist I had occasion to examine into the causes of this so-called poison of cotton-seed meal. We took the thing up thoroughly, the matter being placed in my hands, and we discovered in this cotton-seed meal an actual poison. There were several examples in which calves, ranging up to the age of six months, succumbed to the use of an excessive quantity of cotton-seed meal, and it was due to this poison, which we were able to separate. It was a white substance. We tried it on rabbits, and the effect was fatal. We therefore, by chemical means, actually separated and demonstrated the cause of the poisoning. The result of the examination was that we stopped feeding, in anything like large quantities, cotton-seed meal to young cattle. I may say, further, that the action of the same material upon the systems of older cattle is this: During the first two or three days it causes scouring. They ran out very freely. The stuff passes through the system, which, in the case of the older cattle, accommodates itself to the poison and there are no further effects. I would suggest at this point to you not to go upon surmises, but upon matters upon which you can be definite. Submit the material to gentlemen competent to determine its constituents. The Department of Agriculture has such servants at your service. Come down to facts, and then you will get results. The opinions of men are all equally good until we come to demonstration, and then they may be bad. No man's opinion is better than another's until it is investigated. You may find that in the sorghum plant, at a given age, there is a poison present which is the result of physiological processes going on in growth. At a further stage that poison may be converted into actual food nutriment. These are things which we can determine, and no longer go upon mere surmises. Submit the matter to the Department of Agriculture for its investigation, and possibly you may receive results which will be as valuable in this case as the results were in the case of the cotton-seed meal to which I have referred. This sorghum poisoning is not a matter for conjecture, but for investigation and proof.

The Hon. D. H. DALRYMPLE: Judging from what has fallen from the meeting, this question is one of very deep interest, and I think Mr. Coulson is entitled to the thanks of all present for bringing it forward. Up to the present time it has been assumed that, while it is admitted without dispute that the influence of certain foods is exceedingly deleterious at particular times—while the result of feeding cattle with succulent forage has been known to be fatal in many instances, the causes are exceedingly obscure, and no successful attempt to determine them has ever been made. This matter has been under investigation by the Agricultural Department; chemical analyses have been made which have not been successful in determining any poison. The Government Botanist has been unable to throw any light upon the problem. The opinion of a practical scientist, who has graduated in some of the highest schools and whose attainments are singular, has just been given to us, and I say that the value of his presence upon the present occasion has been fully shown. I think we have never had that which was previously obscure—had, as it were, a flashlight of luminosity turned upon it as has now been done by Dr. Maxwell. With regard to the resolution, which I understand is to be referred to the Resolutions Committee, dealing with this question, I may say that, no matter what happens in the Committee, I can promise you the matter will be referred to the Agricultural Department to begin with, and I shall certainly invite Dr. Maxwell to contribute his experience and his high scientific knowledge to the determination of this very serious problem. I shall merely say, in passing, with regard to swine fever that it seems to be a disease for which there is

very little practical remedy. Certain animals were affected at Mackay, and at the instance of the head of the Agricultural Department action was taken to destroy them. You know very well that there are diseases for which, so far as scientific knowledge has travelled, there is no remedy. The only thing is to prevent their spread. In the matter of swine fever it seems there is no remedy at all. It seems to be the same with rinderpest, scab, and other diseases. At present that is the position, I am informed, of knowledge. At Mackay the destruction of the stock supposed to be affected did result in the cutting short of the spread of the disease.

The Session concluded with the submission of a number of resolutions for reference to the Committee of Resolutions.

EIGHTH SESSION.

Friday Afternoon, 14th June, 1901, 2·15 p.m.

ANALYSIS OF SOILS.

Mr. J. C. Brünnich (Agricultural Chemist, Department of Agriculture): It appears that the remarks made by me on Wednesday evening on the subject of soil analyses have been misunderstood by some members of the Conference. Some seem to imagine that I said the analysing of soils was completely valueless, and that it was, in fact, impossible to obtain an absolutely correct analysis of a soil. That is a totally wrong impression, and, as an agricultural chemist, it would have been wrong for me to have inferred such a thing. What I meant to say was this: that if a sample of soil is taken in a promiscuous way by a farmer and, without any proper precautions, submitted to analysis, then the result would very often be valueless to the farmer. But that has nothing to do with the accuracy of the analysis. Analyses must, in most cases, be of the greatest value. It must not be thought for one moment when I said that in many cases soil analyses were valueless to farmers, that the analyses were wrong or that they were always valueless.

The Hon. D. H. Dalrymple: It is almost a platitude to say if you take an analysis of a specimen from a gold mine that it is exceedingly likely to mislead anyone. But if analyses are taken, under proper conditions, of the average product of the mine, then they may be of the greatest possible value. If I have a farm of 100 acres, grub up a handful of soil and send it to a chemist, that chemist will be able to tell me the constituents of that particular sample, but the analysis of it will be no criterion as to the value of the farm. Certain conditions are necessary to ensure an analysis being of value, but that has nothing to do with the accuracy of the analysis. A farmer in securing specimens should exercise sufficient judgment either in obtaining a sample of the general soil or else get several different samples and submit each one for investigation by the chemist. That chemical analyses are of value is a self-evident fact.

Mr. R. Dart then read, on behalf of Mr. E. Dalton, of Razorback, Palmwoods, the following paper on—

EXTERMINATION OF FLYING FOXES.

[By E. E. Dalton, Razorback, Palmwoods.]

The paper that I have been instructed by my association to prepare and read before this Conference is not with the fixed purpose of bringing before your notice a pest and its remedy, but rather that interest may be excited in and attention directed to that insidious pest that, unlike most enemies that stalk at noonday, flies and devours at night—namely, "The Flying Fox."

There is scarcely one of us present at this meeting who is not thoroughly acquainted with the weird, shrill cry of the flying fox, but I am not so sure if we are likewise acquainted with the amount of damage which is constantly being done by these nocturnal visitors.

In my district, of which it is sufficient for me to speak, whole acres of plantations of the variety of bananas commonly known as "lady's finger" can be pointed to where, in the winter months, not one single bunch can be marketed owing to the depredations of these midnight marauders.

Nor is their attention confined to lady's finger bananas, as the other varieties are readily attacked and eaten; and, what is more alarming, the flying fox is turning his attention to the orange crop. Now, in my district, as in others, the orange crop is eventually to become the chief and permanent crop, and that we can produce fruit of this description to be proud of, is evidenced by the success lately attained by this district at our last National Exhibition.

Therefore, if this important industry is to be materially interfered with by the flying fox, the outlook is indeed gloomy. Without dilating upon the damage done by this pest, let us proceed to discuss a remedy.

Some time ago it was suggested that foxes might be exterminated by the introduction amongst them of chicken cholera by means of inoculation. Through the courtesy of Mr. Pound, however, I find that the experiments carried out by him have not been attended with much success, as far as contagion is concerned. We would like to see a series of experiments tried, and a thorough trial given to the most successful, as the subject is fully worthy of it.

Recently, my association applied to the local government to take the matter in hand, as apparently it is within their province to deal with the matter. One of the members, however, after having discussed the merits and beauties of these lovely creatures, moved that no action be taken. His motion was carried. This to show that we have no hope from that quarter, at least for the time being.

It can readily be seen that no good whatever can result from one district acting alone, but if a united effort were made surely something could be effected.

I sincerely hope that the question will be discussed, and some suggestion given which shall eventually, by united effort, be successful in eradicating the pest.

DISCUSSION.

Mr. J. ROSE, Junr. (Woombye): I do not think it is right to ask the divisional boards to take up this matter of flying-fox extermination. Ratepayers would not stand it, and we will have to think of some other scheme. The one that comes before my mind is to spread some infectious disease among the foxes, and I do not see any other way by which we could get rid of them. I suffer from flying foxes myself. I went down to see a Mandarin tree that a few days before had four cases of fruit on it. That morning, thanks to the flying foxes, there was not a single mandarin on it. I would like to hear the views of Mr. Pound upon the idea of a contagious disease being spread amongst the foxes.

Mr. F. W. PEEK (Loganholme): I am very pleased that this matter has been taken up, as I know by experience what a pest the flying fox is. I am rather inclined to agree with Mr. Rose's views on the matter, and now think it is time we approached the Agricultural Department on it. We have approached the divisional boards, and it is quite certain that we are not likely to get much help from them. The winter before last I lost between 600 and 700 bunches of bananas through flying foxes, but last winter they were not so bad. This winter, however, they seem to be worse than ever.

Mr. H. G. HABLER (Tinana): Last year up in the Maryborough district the foxes did a lot of damage in the orange crop. Being nocturnal visitors, of course you cannot get much chance of shooting them, and the only thing that I can see is to ask the divisional boards to take the matter up. For one board to do so would be useless, and it must be taken up by the whole of the State at the one time. Perhaps the Department could go into it and devise some means whereby the pest might be eradicated. Some time ago I read in the *Queenslander* of a disease that was killing the flying foxes out in the South Sea Islands. The Government could find out if there was any truth in that, and if so, introduce the disease so that we might get rid of them here. Another thing that might be devised would be to explode some noxious gas in their camps.

Mr. J. WILLIAMSON (Beenleigh): This question of the destruction of flying foxes is a very important one, and it might be interesting if I give a few details of what we are doing in the Logan and Albert. In 1897 there was a circular issued from the Agricultual Department informing the divisional

boards and agricultural societies that they could form boards for the eradication of the pest, and that the Department would subsidise money expended for that purpose. A board was formed in Beenleigh, and £5 each was contributed to it by the Beenleigh, Waterford, and Tingalpa Divisonal Boards and the Agricultural and Pastoral Society of Southern Queensland. This made £20, and we informed the residents that we would give 1½d. per head for each fox brought in to the secretary. The Department gave us a subsidy of £9 7s. 10d., and up to the present we have destroyed 5,729 flying foxes, at a total cost of £35 16s. 1d.

Mr. A. T. Coomber (Bundaberg) : I must congratulate Mr. Dalton on his paper, and I can bear out his statements relative to the destructive propensities of flying foxes, especially with regard to mangoes. I know they destroy enormous quantities of this fruit belonging to me. As for divisional boards taking the matter up, I think that the money collected by the boards is for the purpose of making roads, and that it ought to be devoted to that purpose. To take any of that money for any other purpose would hardly be fair to the other ratepayers. The best line is to ask the Department of Agriculture to take it up and try and find some specific that will kill the foxes. I would suggest that they be destroyed in their camps with some poison, but I do not think that anything useful will ever be done if the matter is left to the divisional boards.

Mr. L. G. Corrie (Brisbane): There is one difficulty in connection with this flying fox question, and that is, in some seasons they are very bad, possibly through the absence of some natural food in the bush, and then for a year or two they cause very little trouble. I remember going to Mr. Thynne to see if the Government could give any assistance. Mr. Thynne laid down very distinctly that the Government would do nothing unless the fruitgrowers were prepared to put some of their own money into it. He laid down that there was not much difference between it and the rabbit difficulty.

Mr. Dalrymple : Or the cockatoo difficulty.

Mr. Corrie : £1,000 were placed on the Estimates to subsidise local effort, but as far as I can remember there were only one or two applications for any of that money. A difficulty is that the flying foxes camp in one division and do their damage in another. My own opinion is that unless there is co-operation among the fruitgrowers there is very little chance of dealing with the pest. I am a grower, have been injured by flying foxes, and I am quite prepared to pay my share towards some scheme for their extermination. The matter affects us, and if we get rid of them, the small expenditure we incur by so doing will be repaid by the increased yield from our trees. The Government have men of skill, and I think they are willing to assist us. Mr. Pound has done much, and will perhaps be able to do more. If you can actually locate a camp and can shift it, you have a respite for the rest of the season. I remember a case where, in Fiji, a lot of damage was being done to the banana plantations. The flying foxes' camp was found to be on a small island whither the planters sallied out and kicked up such a hubbub that they drove the foxes off that island, and for years after had no trouble from them. There was a suggestion about bursting the camps up with lyddite, but I do think the best thing of all would be to find out some disease of the flying fox that could be cultivated and disseminated through them. A Mr. Reed, from Samoa, said that such a disease had been successful there in destroying large numbers of flying foxes. He came to Queensland, and I remember I had enormous trouble in getting him some live flying foxes. I got him a few in the end, but I do not know how his experiments turned out. He did not come back to me, and I have heard his experiments were a failure. The mature flying fox has got a very pretty piece of brown fur, and if that could be cured and sent home, and there was a certainty of a lot of it being supplied, possibly the payment for the scalp could be eked out if the skin could be shown to be of commercial value. I think it would be worth while to send some of the fur to England to see if it could not be made an article of value.

Mr. J. W. LEE (Zillmere): I tried twenty years ago to destroy flying foxes, and I do not agree with those that think the divisional boards should not deal with the matter. I think the boards are the people who should take it up. They are located all over the State, and if all took the question up I am sure they would contribute enough to enable a man to go out to the camps and destroy thousands. They hang in their camps in thousands, and it needs only a few men with guns to shoot them down by the ton. The thickness in which they hang is astonishing, and I have known a man to shoot six with one shot. It is said that the general ratepayer would not benefit by having flying foxes destroyed. I have to pay a water tax, although I do not get a drop of water from my board. I have to pay taxes to provide pumps in various places where the people have no water. The general ratepayer has to pay for the destruction of plant pests like lantana, although he may not be directly affected by their presence in his division. I believe that if the boards were to take the matter up the difficulty could be grappled with. I have been a member of a board, and have tried for years to get it to do something in the matter of flying-fox extermination. The farming population, however, does not seem to have that humanity of feeling for the general welfare of the people that it might have. I do not ask the Government to do it, for I believe it can and ought to be done by the divisional boards.

Mr. D. MILLER (Bowen): I would suggest that the best way for the getting rid of the flying fox is for the parties interested to take united action in the matter among themselves. They could form a board from among the different associations, and agree to tax themselves to a small extent at so much per acre or tree, and ask the Government to subsidise the amount raised at the rate of £1 for £1. That would be the best way, in my opinion. As for the divisional boards taking the matter up, I think it is out of their province altogether. Divisional boards are not farmers, nor yet fruitgrowers. They simply have to look after the roads. It is the farmers themselves who are interested, and they could establish boards among themselves and at comparatively small cost. The flying-fox pest is a very serious one to the State, and the sooner these boards are established the quicker we shall get rid of it.

Mr. RIDLEY (North Pine): Mr. Lee always wants to make out that farmers are very selfish, but there is probably more of the milk of human kindness in them than he gives them credit for. There is generally a camp of flying foxes that come every other year to Mr. Bell's place, on the North Pine. He has a bit of scrub there, and the foxes pay it a visit now and again. About eight months ago there was one of the largest camps ever seen in the district. Mr. Bell is not one of the selfish sort of farmers, and he fixed a day for a grand attack on the camp, sent round to all the neighbours, provided a good spread for them, and on the appointed day thousands of the foxes were killed. That, I think, is the way to get rid of the pest. Find out the camp, let the neighbours gather together and shoot the vermin down.

Mr. T. E. COULSON (Rosewood): There are a number of fruitgrowers in my district, and, like the rest of Queensland, they suffer from the flying fox. I do not know one farmer who has not a pest of some sort. In my district some of us are called upon to pay for the pests which belong to other people. It is mostly in scrub land that flying foxes camp. These lands are very often lying idle, being held by persons who bought them up for speculative purposes. They are a great nuisance, and the flying fox is not the only pest that they harbour. Wallabies range on these waste lands. The result is that we are called upon to pay a tax for other people's vermin. I agree with what Mr. Corrie says. If the fruitgrowers were to pay a tax, the same as we have to pay for the destruction of vermin, a fund could be raised which would be something to work on. We farmers have to pay so much on our cattle for the destruction of wallabies, kangaroo rats, paddy-melons, and so on. I have no doubt but that boys would go out and shoot the foxes at their leisure. I happen to know a little about flying foxes, and my experience is that you get one pop at them and then they are off. They are like the Boers, and would

sooner fly off than be shot. Perhaps, as an article of commerce, as Mr. Corrie said, there might be a good sale for the piece of fur on their briskets.

Mr. G. SEARLE (Toowoomba): The flying fox has been a pest for a long time, and I think the only remedy is for the fruitgrowers to tax themselves. The general fruitgrower in my district is prepared to do so, provided there is preconcerted action throughout the State to pay the tax. This is a matter which should be taken up by the agricultural and horticultural societies without badgering the divisional boards or the Government. If a good case could be presented to the Government, I doubt not it could be induced to subsidise local effort for the destruction of flying foxes. With regard to what the last speaker said about shooting, there is no difficulty in shooting them. We spent a great sum of money a good time ago in destroying thousands of flying foxes that were then devastating the Toowoomba district. A company of gentlemen went out—twenty-four altogether—and they were shooting foxes all day. There was no doubt but that thousands were destroyed. We thereupon announced that we were prepared to pay 2s. per dozen for the scalps to those who chose to take up the industry of destroying flying foxes. The difficulty, however, was not in shooting the flying foxes, but in getting hold of the animals after they were shot. I have killed ten in one shot, but they still hung up in the vines after they were dead, so that it is impossible to get their scalps. These flying-fox camps, I may mention in passing, destroy hundreds of acres of scrub with their excreta.

Mr. C. J. POUND (Government Bacteriologist): The experiments in flying-fox destruction carried out in Samoa have been referred to. Mr. Reed was introduced to me by Mr. Thynne, and we carried out a series of experiments with the bacillus *Typhi murium* discovered by Loeffler for the destruction of mice. Mr. Reed told me the same experiments had been successful in Samoa, and we tried them here under all kinds of conditions. We got fifty or sixty flying foxes, used the bacillus, and unquestionably everyone died in due course. But this is a disease of the intestines. In fact, it is really typhoid. When you communicate the disease to one fox, its excrement is spread about over the food which has to be partaken of by the other foxes in captivity. But, in natural conditions, the difficulty is to see that the excrement is spread over the food of the other foxes. That was the great trouble. As for chicken cholera, I have tried it and found it to be a failure. Someone has mentioned lyddite, but I fancy the lyddite theory is exploded. Then there is electricity. I know a place where a lot of wires were put up and an elaborate system arranged whereby to destroy a flying-fox camp. It cost about £150, and, I think, resulted in the death of about seventeen foxes. I hardly know what to say about Mr. Corrie's idea of frightening the flying foxes away from their camps. It is just possible, if we turned up the dates, that we would find that flying foxes were very bad in Australia just after they were turned out of Fiji. It is no use trying to introduce amongst flying foxes some disease belonging to some other animal, because all those diseases which are known to us have proved failures in this connection. If you can get hold of some disease peculiar to flying foxes, efforts to spread it might perhaps be successful. If some of the fruitgrowers going into the camps find some foxes that appear to be suffering from a disease, I will make an examination of them if they send them down to me. Of course, my aim would be to secure a disease peculiar to the flying fox and not communicable to human beings or domestic animals.

Mr. HENRY TRYON (Entomologist, Department of Agriculture): We have no bugs as large as flying foxes, so I am sorry to say the subject hardly comes within my scope. In 1889 I had occasion to say something about the flying-fox pest, and I not only suggested that it would be feasible to shoot the flying fox, but also that it might be feasible for the fruitgrowers to assess themselve to defray the cost of this work, not necessarily to carry out the work themselves, but by others who might make a business of it. I believe something has since been done in this direction. I also suggested that it might be

possible that the fur had a commercial value, and went further than that. I secured the skins of some flying foxes, and submitted them to a high authority in Sydney—namely, the Curator of the Technological Museum of that city. I suggested that he should obtain the opinions of furriers as to whether the fur had any market value, because I was aware that where the fur trade is a large concern, the fur of some animals which are very small commanded a high price, and I was of opinion that the fur of the flying fox had some estimable qualities. The Curator of the Sydney Technological Museum elicited some opinions from a number of furriers, and they intimated to him that, if the fur of the flying fox could be put upon the market in sufficiently large quantities and a continuous supply guaranteed, they had no doubt that it would defray the cost of destroying them by the means I indicated. I have given some consideration to the subject of destroying flying foxes by disease, but I am unable to communicate any facts. I went so far as to communicate with a Russian gentleman in St. Petersburg, who has made the study of this microbe, or bacillus *Typhi murium*, a subject of special investigation. He sent me his pamphlet, which was printed in Berlin, but it really did not, in my opinion, offer a suggestion that it was possible to utilise it for flying foxes, and Mr. Pound, by experiment, has found that my surmise was correct. I will go further than that. Mr. Pound has suggested that if we could find a disease peculiar to the flying fox, so I understood him to say, it might be available for the destruction of flying foxes. Much as I respect Mr. Pound's views in matters of this kind, I feel myself compelled to differ from him, and I may say I have had some experience of the utilisation of disease in the destroying of animals; also, I am somewhat acquainted with the literature on the subject. I have never heard of a single instance in which a disease peculiar to one animal has been successfully utilised for the destruction of animals of that kind except in the instance of the utilisation of Loeffler's organism. In this case the animals which were destroyed were cannibals—that is, animals which fed upon each other.

Mr. DART (Razorback): I must thank all the speakers, on behalf of my association, for the information they have given on this subject. As for wallabies, I think we all have our share in paying for the wallaby scalps, so I think it would only be fair if we asked the Government to help us in this matter of the extermination of flying foxes. These foxes also transmit diseases from tree to tree, and their destruction is therefore desirable, if only on that account. If the fur is of commercial value, then that would be an additional incentive to persons to destroy them.

The Hon. D. H. DALRYMPLE: I am sorry the time does not permit of my speaking at length upon this subject. Several views have been expressed by the different speakers. While all agree that the flying fox devastates orchards and makes it extremely difficult to get fruit when you have succeeded in growing it, the question ultimately seems to be, Who is to pay for their extermination? Some seemed to think that it was a case for State action alone. Others thought the local residents, through the medium of the divisional boards, should undertake the work; while others, again, thought it should be dealt with by individual enterprise. It was pointed out, and it seems to me reasonable, that flying foxes, if they were harassed, would undoubtedly soon leave a district. For my part I have some boys of my own, and it seems to me if you could only supply a few boys with guns that nothing would suit them better. I dare say they would soon find out the difference between a flying fox and a bird, and I am satisfied they would find a good deal of amusement in shooting flying foxes. Flying foxes used to be very bad in a garden I once tried to cultivate. We have this afternoon had the pleasure of listening to the opinions of experts on this subject, and it seemed they were disposed to give it up, that the flying foxes were disease-proof, or that you would have to go and catch some new disease which would not affect anything else and yet would be deadly to the flying fox But I have read of some remedies that were published. One was that you take fish hooks, suspend

them on a line, hang them on a tree, and probably in the morning you would find them studded with flying foxes. I found that the flying foxes were very good judges, and I thought, if I hung my hooks on the tree which bore the best peaches, that I would have a better opportunity of making the experiment a success. In the morning I found that I had not misjudged the flying foxes' discrimination, for the whole of the peaches on the tree where I had hung the hooks were gone. They had left me the fish hooks, however, and for that I was thankful. I then thought that it would be just as well to call in experience from outside, and I found some kanakas who were familiar with the flying fox. The kanaka will prefer a flying fox to a duck as a delicacy. They told me I should get a bamboo pole and hang on it long red or white streamers. I took their advice, but discovered in a day or two that the fruit went exactly the same, with the only difference that, in this case, I lost the streamers. It appears provision was made by the Government for the granting of a subsidy for the destruction of flying foxes, but that very little advantage was taken of it. Of course, a vote of Parliament lapses if not spent within the financial year for which it was granted. I shall look into the matter, and, if the Treasurer is willing at the present time to allow a certain sum of money towards the destruction of flying foxes, I personally shall be inclined to recommend it. I fully admit the disabilities of fruitgrowers in the matter, and know myself the evil which these particular creatures are.

The following papers were then read:—

PINEAPPLE-GROWING.

[By MR. J. ROSE, Junr., Woombye.]

My paper will deal chiefly with smooth-leaf pineapples, but, as both rough and smooth-leaf will grow and thrive under the same conditions, this article will apply to both.

Now, the first matter that I shall deal with will be how to grow pineapples at a cost that will allow a profit to the grower. This is a most necessary thing to be studied, as there are times every year when a grower realises very small returns for his fruit. I do not mean that a grower shall sacrifice quality of his fruit for cost of producing same, but I maintain that pines can be grown under favourable conditions at half the cost to pines grown under unfavourable conditions.

I have found from practical experience that, under favourable conditions, pines bear their fruit much earlier from date of planting, require less nursing, a better quality of fruit and twice the quantity is gained, and in this way the cost of producing it is much less.

Every case of failure in pineapple-growing can be put down to one or other of two causes. Either the soil is not suitable or the frost is too severe. Now, the first thing an intending pineapple-grower should consider in choosing his land is this—Is the land free from frost or nearly so? No matter how favourable the conditions of the soil may be, if it is subject every year to a very severe winter, failure will be the result of any person attempting to grow pines on such a piece of land.

Some growers cover their pines during the winter months with grass and weeds, which protect them a great deal; but, where this is necessary, pines should not be grown, as the cold penetrates the plant, and small fruit is the result.

Great attention must be paid to the wants of the plant in this respect, as the pineapple is a tropical plant; and, if planted in the proper locality, as before stated, the following results will be obtained:—

Early bearing of fruit, and quality and quantity of same;

Intermediate or pines out of season, which realise a good price; and the most important of all reasons:

That, if it be planted in a good, warm locality, the life of the plant will be almost doubled and will be less subject to any diseases.

Too much stress cannot be laid upon the fact that land requires to be free from frost for successful pineapple-growing. There is plenty of such land available in districts where the country has not been opened up extensively. To my idea, the most suitable land is small clearings of not more than 20 acres, with a belt of forest timber standing round, which forms a splendid protection.

I have known a really first-class patch of pines to be ruined by a grower cutting down standing timber near by, and by so doing he allowed the westerly winds and

cold to get in. A great deal has been said about the proper aspect for pines, but I have found that pines can be grown successfully, if the soil is good, upon any aspect, provided you have a good solid protection from the west.

The drainage for pines requires to be good, and I would recommend hillsides for this purpose, as the pines seem to thrive much better there.

Great care must be taken upon such hillsides that your soil will not wash or break away in the rainy season while your plants are yet small and have not covered the ground. Now, to prevent this, I have found it wise to always plant your rows across the hills, and to plant in double rows or two rows side by side, about 2 feet apart, and plants to be about 18 inches apart up and down the rows, and 8 feet between the main rows.

If planted in this way, it will take about 4,500 plants per acre, and after the first year every row will form a complete hedge, so that the water from heavy rains will not wash or break through the rows.

There are a great many ideas as to the depth at which pines should be planted, and some growers dig out trenches in their land as much as a foot deep and plant their pines in the bottom to allow of the soil filling up as the plant grows out of the ground, and in this way the plant is supposed to last and bear its fruit much longer.

But I am not an advocate for deep planting for several reasons. It is well known that the pineapple is a surface plant, and will only thrive on the surface.

Now, the first foot of soil is the part from which the plant derives all its substance, and below that, in the subsoil, which in most cases is very poor, the plant will not grow.

In my experience of deep planting I have found that you hold the growth of the plant back a great deal, as it will keep struggling till it gets to the surface before it makes a vigorous growth. As I have before stated, by deep planting the plant is supposed to last and bear fruit much longer, but I am sure, by so doing, the plant will be one year longer before it bears its fruit.

In this way I have known plants to take three years before they would fruit, whereas they should have been about eighteen months. My advice to anyone would be to plant in a furrow after a plough, but not deeper, and to be very careful not to bury the neck of the suckers when planting, but just put them in deep enough so that they will stand firm.

My idea in preference to deep planting is to fill up with soil and manure round the plant still as they grow out of the ground, and I am sure in this way better results are obtained. A great deal depends upon the nature of the soil as to the way pines grow out of the ground and fall about. For instance, heavy scrub land that would suit corn and potatoes, if you were to plant pines in it you would find after a short time the roots of the plant come to the surface, and the plant will get very loose and fall over on its side. Before I leave this part I would like to say that I am sure three parts of the difficulty—that of pines growing out of the ground and falling down—is overcome by planting them in suitable land, where they seem to naturally take a much firmer hold of the soil. I will now explain what I have found to be the most suitable land for this purpose. If possible, get a piece of forest land with the timber and undergrowth standing upon it. Then get it felled, and let it lie about six months to dry. Then get a fire through it, and have it stumped and cleared ready for the plough. All this may seem a great deal of labour and expense, but it is far better to do this than waste time and money on land that has been lying idle, growing weeds and bushes for years and so has become very poor and sour.

Pines planted on new land such as I have pointed out will not need manure for years, as they get all the ashes from the burning, and there is a quantity of decomposed wood and vegetable matter in the ground which keeps the plant well nourished for some considerable time.

Now as to the soil most suitable for pineapple-growing, I have found them to thrive best in a deep, loose, sandy loam, which may vary in colour from black to red, but of the two I would prefer the black soil. I consider a clay subsoil to be the very worst upon which pines can be planted. Clay subsoils keep the ground wet and cold, and, I am sure, is greatly the cause of disease in pineapples; therefore it is most necessary that your ground should be loose and open. Very beneficial results can be obtained by manuring pineapples, especially with ordinary stable manure.

If this manure is dug or ploughed into the roots of the plant before the winter comes on, it seems to keep the roots of the plant warm, and, as a result, you get a very heavy crop of winter and intermediate pines, which, as I mentioned before, are a great consideration. Pines coming in in off seasons are of great value, as they will always find a good market; and I have no hesitation in saying that manure is the only agency that will produce pines all the year round.

To put land under pines in the way I have described will cost about £25 per acre, and is made up as follows:—£2 per acre for to fell the timber, £12 to stump and clear the land, and the other £11 would be spent in preparing your land and cost of plants and planting same.

This may seem a big outlay, but, if planted in suitable land, this will soon be returned, as the pineapple is a heavy and sure cropper.

I have stated that it takes about 4,500 plants per acre. The plants should bear their fruit at eighteen months from date of planting. With an average price of 2s. per dozen this would mean about £38 per acre for the first crop, and, as the suckers spring up round the plant, your crop is more than doubled, and your returns rise accordingly.

Our local market for pines is not too satisfactory, and, I feel sure, could be greatly improved, as it is often the case that, in one part of the States, pines are a glut in the market; in other parts they are just as scarce, and in this way you will find that on the same date, but in different parts, the prices vary from 1d. to 1s.

In conclusion, I must say the great secret of pineapple-growing is the same that applies to all other crops.

Get on to suitable land for the purpose. Work it up thoroughly. Don't let the weeds rob the plant of part of its living, and give the plant something in return for all it gives you in the shape of a little manure, and you are bound to succeed.

THE FRUIT INDUSTRY OF QUEENSLAND.

Motto: Queensland to the Front.

[By W. P. Cooksley, Brisbane.]

In the whole of Australasia no State has such facilities for the production of fruit as Queensland.

From Point Danger to Cape York along the whole coast-line, vast areas of rich agricultural land can be obtained at small cost to the orchardist, over which area the regular rainfall is fully sufficient to grow such fruits as can be produced thereon.

The climatic conditions of Queensland enable the orchardist to grow such varieties of fruit that he has a rotation of crops the whole year round, and need not necessarily depend on any one variety for a living.

If Queensland is to hold her own in the Commonwealth, she must of necessity look to her productions, and we, as growers, must put our shoulders to the wheel and never look back until we have placed our industry in the forefront in Australasia.

Our industry is practically in its infancy—been an infant too long—and is now begining to creep, and very soon we shall have to look to other markets than those of Australasia.

For many years our Agricultural Department has neglected this great industry. Much might be said of the indifference they manifested by the culpable neglect in not taking measures to check the spread of the numerous scale diseases they and others imported into our State when it would have been an easy matter to do so.

As usual, the gate is locked after the steed is stolen, and elaborate and expensive methods are now in vogue for the suppression of what might easily have been nipped in the bud.

Having at last seen the error of their ways and been awakened to the importance of the fruit industry, the said awakening will be of very little use to the State unless they follow on the lines of progress by introducing such measures and men of ability (not through the influence of members of Parliament)—men only who know their business, whether it be drying, canning, packing, or curing; and only such as are necessary for the development of the various phases of the industry. It is no use mincing matters —if we are to go forward we must be taught by men who are competent to teach.

The following fruits can be cultivated with profit to the grower, viz.:—Apples, pears, cherries, plums, peaches, nectarines, grapes (dessert and curing varieties), tomatoes, pineapples, bananas, custard apples, persimmons, mangoes, figs, strawberries, Cape gooseberries, and all kinds of citrus fruits, to say nothing of many kinds of fruit which are more or less unknown to the ordinary individual. On the downs and highlands of Southern Queensland, such fruits as apples, pears, plums, peaches, apricots, cherries, grapes, &c., are cultivated to some extent, but very few of our orchardists can be congratulated on their endeavours so far. They have mostly planted in ignorance, or on the suggestion of travelling agents for southern nurserymen, worthless and indifferent sorts of fruit trees, which do not pay for the land they occupy, let alone for cultivation. Some few, however, discovering their mistake, have either rooted them out and planted others, or worked payable varieties on the old stocks.

The question of the packing of fruit for market is one that our average fruit-grower is slow to grasp, and the want of knowledge is a matter which affects the marketable price of his productions. As a rule, any sort of package suits him for the purpose of transit. Size or material is no object, and in many instances, nail or kerosene cases are used, the previous contents of the cases not being taken into account as having a deleterious effect upon the flavour of the fruit packed, and thus lessening the value of the product and creating a distrust among those consumers who have handled the brand on previous occasions.

Unless a standard case suitable for the various fruits, only to be used once, becomes compulsory, the success of the fruit industry of Queensland will never be attained. There is no reason why, with all the fruit land available, Queensland should import the quantity of southern fruit she does during our own season, and our growers must bestir themselves in this matter, and produce first-class fruit, not only sufficient for local requirements, but for export.

In our Western country we have large tracts of land suitable for the cultivation of raisins, currants, figs, &c. The climate being naturally dry, it is a factor in the production of dried fruits. With such natural resources, how is it that we are annually sending thousands of pounds to foreign countries for dried fruits? We have better facilities for conveying our fruit to market than the people who started the settlement at Mildura, and see what wondrous strides they have made in the last few years with their dried fruits.

Let us see to it that we do not neglect our opportunity. On the coastal districts we can grow in abundance such fruits as the pineapple, banana, tomato, custard apple, persimmon, mango, all varieties of citrus, and in the Southern portion Cape gooseberries and strawberries. For many years the pineapple and banana industry round about Brisbane was a most profitable crop, but with the expansion of areas of cultivation, prices became so low that very few of the early growers have continued to grow them, preferring rather to sell their holdings for building purposes.

Still, with low prices, the pineapple and banana are produced at a profit, and there is a great future before both varieties of fruit.

We must have a canning and dried fruit establishment to utilise our surplus fruit, such establishment to be worked on business lines. We must get the best men possible and turn out a superior article, and we would then be able to compete against the world with our products.

At present we have to rely upon the southern markets to consume our output, and very often the returns do not pay the cost of production, and for the loss caused by heavy freights and careless handling, and obsolete means of transit on both railway and steamer.

We must have proper fruit trucks constructed for carrying our fruit from grower to market, and it is a shame to see the amount of loss annually to the grower through the negligence of the Railway Department.

Perishable fruit is daily put into box or open wagons, the latter covered with a tarpaulin and left out all day on the line to sweat, and on arrival at its destination, bananas especially are just as if they had been boiled. These remarks apply also to steamer transit. Many times I have seen crates of bananas unfit for use through over heating in the holds, and only last month a consignment of pears from the south worth £300 was simply lost through being put into the hold to make room for a few sheep. Custard apples and persimmons have not so far been produced in any great quantity, and good markets for same can be found in the southern States. These fruits have been grown here for a considerable time, but have been a long time securing the palate of the customer; such also can be said of the mango. Our southern friends do not like mangoes at all, which is a considerable loss to us, as large quantities are grown and consumed in our State, and in a prolific season the mango does not pay to market. The requirements at present for condiment (chutney) are limited, yet we import annually large quantities of foreign chutney. Cape gooseberries and strawberries pay the present growers fairly well, the gooseberry finding a ready market at the jam factories, and when the intercolonial duties come off, larger fields will be open for the output, and the preserve takes well in our southern cities. We export annually many thousands of quarts of strawberries to the southern cities, and if better facilities and more careful handling were carried out by the Railway Department, the growers' returns would correspondingly increase. Why is it that the backbone of the country always has to suffer?

Citrus Fruits.—Queensland may be very properly styled the home of the citrus, for in no part of Australasia does this variety of fruit grow so luxuriantly, but there is a thorn to every rose, so also the citrus tribe has its enemies, more so, I believe, than any other fruit. All kinds of scale insects attack it, and seem to have a preference

for citrus trees. The fruitfly also destroys thousands of fruit in a season, besides which, owing to the want of a little common sense in departmental reciprocity, growers cannot export without risk of probable loss. Every year our production of oranges and mandarins is increasing, and the time has now arrived for finding fresh markets for our produce.

If we are to export our oranges to British and foreign markets and compete with those already in the field, it will be first necessary that we ascertain what markets we can best dispose our fruit in during our fruit season. To ascertain this properly, Queensland must send *a live man* to view what Cousin Jonathan and others are doing in the fruit industry elsewhere.

Secondly, we must have central packing and curing houses in each producing district where the fruit can be graded, packed, and cured in a proper manner.

If we do not export one brand, and that the best, it is better not to export at all. But before we can export at all, it is first necessary that we turn our attention to the cultivation and cleansing of our orchards, for unless we extirpate our scales and fruit-fly, we cannot place our fruit on our own market, much less export it. For many years citrus-growers have been fighting scale diseases with little or no success. I visited an orchard the other day that had been twice cyanided in one year, and although twelve months had not elapsed since it was done, there was more scale there than before it was cyanided at all.

Owing to our citrus fruits maturing in the winter, the demand for same is limited, but there is no reason why we should not cure and store them, placing them on the market during the summer months when there is a greater demand for them. In Victoria, the successful lemon-growers cure all their best lemons, and practically keep out the Messina fruit. In Queensland, we grow lemons to no advantage. What is done with the lemon in Victoria can be done with both orange and lemon in Queensland. Why not do it? At a fruit show the other day, I saw some lemons that had only been a few weeks in a curing-house; a better lemon has not been grown in Queensland; but, if they had been left on the trees until they coloured, they would have grown to the size of citrons, and would have been of no commercial value. If our citrus-growers are lacking in education as to the curing process of citrus fruits, I would urge them to approach the Government, and ask them to put up a packing and curing house in a central district (on similar lines as the central mill system), where growers could have their fruit cured at a nominal expense, and marketed to the best advantage.

In conclusion, let me urge upon growers the necessity of keeping before them the importance of the industry under discussion, and which will serve as the stepping-stone to fortune if only patient perseverance, continued with unflagging industry, is associated with daily work.

Keep a watchful eye upon all the enemies of plant life which are calculated to destroy your trees or crops, and fight them to the death. Keep in touch with the department which controls and aids our fruit culture, and do not hesitate to question them when in doubt as to the best means of arresting and destroying the diseases of plant life. Cultivate only such fruits as your soil is suited for, and do not operate upon more land than you can keep in thorough order, always remembering that weeds grow apace, and after having surmounted the difficulties of opening up all orchards do not allow the grass to creep over the ground as an evidence of attempting more than can be managed.

Remember that success will attend those who use care in packing, and to reflect credit upon yourself as a grower and the industry in general, is to be particularly careful in grading and in the style of packing adopted.

To our Department of Agriculture I would offer the suggestion that they proceed on the lines of progress, and supplement the good work done by them by seeing that our State does not lack for want of information and education whether in growing, packing, drying, curing, or marketing, and by so doing it will render the fruit industry of our State second to none in Australia.

PICKING, PACKING, MARKETING.

[By C. Atthow, Brisbane.]

In this paper I do not intend to give general theories or faddist's opinions, but observations and experience gathered during the quarter of a century in which I have been engaged in fruit culture and sale.

Picking.—Little should need to be said on this, as a few years of experience should teach growers all that is necessary, yet thousands of cases of fruit are wasted each year through want of care here—markets are spoilt and prices reduced by half.

To begin the season, many pick too green. Being new in the market, the first are readily bought, only to cause disappointment and disgust to the buyer, who will, consequently, not purchase again for some time, thus limiting sale and lowering prices, even though well picked and packed. Again, to send what is termed a load, much immature is picked and mixed with mature and saleable fruit. This is a great mistake, as the good by itself would realise the double amount as when badly picked and mixed. Again, the nature of each variety should be fully known, as some may be picked green and will ripen with good colour and flavour, while others turn hard and tasteless. The time when each variety may be profitably gathered can only be known after careful observation and experience. Hence picking should be done only by experienced persons. Further, all fruit should be picked, not shaken, from the trees and carefully placed, not thrown, into baskets. If shaken from the trees, the fruit may get pierced or bruised in falling; a few only thus damaged in a case will spoil sale, and, consequently, they will only realise about half price. The fruit should not be left in the sun. It turns most fruit dull in colour and tends to softness, thereby damaging price and quality. Care should also be exercised that the fruit is perfectly dry, not only from rain but also from dew, as such generally discolours and causes the same to keep badly. The distance of market and nature of climate need careful consideration. For short distances, especially if colder fruit may be fairly ripe, while for distant markets, especially to a hotter climate, the fruit should be picked as green as possible, always providing the fruit is fully matured. Here let me strongly condemn the practice followed by many in picking for home markets, and then on finding that glutted send to long distant markets, expecting it to carry and to bring satisfactory returns. They cannot expect such results, and yet many cases are frequently heard of where the shippers or growers condemn the market, and vilify the salesman when in reality it is their own thoughtlessness.

Summarised.—Fruit must be fully matured; send only what is of good quality, not to mix good with bad. The nature of each variety should be carefully studied. The fruit must be picked, not shaken from the tree. On no account pick when damp with dew or rain. Study the distance of the market, also climatic conditions when picking.

PACKING.—All must know that well-picked and packed and graded fruit packed in usual marketable size, clean and neat cases, will realise the highest market rates. Thus, if growers wish to succeed in all instances, fruit must be carefully packed by hand, not thrown into case; case must be well filled and neatly finished. If fruit is of uneven size a good plan is to leave off the bottom instead of the lid of case. Thus top will be packed first, giving it a neat and finished appearance. In this way small fruit can be made to look very neat. In the case of cherries the stalks will not appear, and, in many, fruit designs can be made such as crowns, or hearts, &c., which look well on opening lid. In packing do not top—that is, put the very best on top, neither put the small or discoloured in centre. This is so soon known by purchaser and the brand condemned, causing ultimate loss to packer.

Wrapping Fruit.—This is needed for the English market, and is greatly done by the American and Italian packers, but generally for the Australian market it is best not to wrap fruit. To wrap, the grower must have a quantity of uniform size and colour, or buyers hold off, considering that paper is used to fill case or to cover some defect. Hence small shippers should not wrap. For short distances close cases are the best, as fruit ripens brighter and of a richer colour when not exposed to air.

Grading.—Not much of this can be done except on large orchards where it is essential to success. For small and local markets two grades only are needed. More than this causes more loss than gain. In some cases, sorting two or three cases out of about ten will be sufficient, marking them No. X and sending the others plain. As orchards or markets get larger, further grades will be necessary. As to cases as regards shape and size, this is a question at present unsettled, consequently I do not think it becomes me to touch on this. At present use the cases in general use now in the markets where fruit is to be sent.

For apples, the Tasmanian apple case, especially the dump or English case, is in most favour with buyers. The Sydney light wood orange cases meet with most favour for oranges and lemons, also for soft variety of pears.

As to quarter-cases, as they are called, at present they are made in all shapes and sizes, so I will not go into any particulars with regard to them. The best classes of pears, peaches, plums—in fact, all soft stone fruits, tomatoes, gooseberries, apricots, &c., should always be sent in quarter-cases.

Grapes.—No special case has yet been devised for these, but the long Tasmanian bushel and half-bushel cases find most favour at present.

Marketing.—Small growers should dispose of crops in home markets, as not being able to send quantities of uniform quality and size to make regular shipments, small quantities generally prove unsatisfactory. Large growers must find distant markets as local are soon glutted. Do not wait for payable prices before shipping; send each season small lots regularly, even if not fully satisfactory at first. This will give a fair and thorough knowledge of market's needs and general prices. It may result in encouraging the use of such fruits, it will divide the bulk of the crop, and help maintain full prices in nearer markets, thus giving a better average for the full crop. While giving a full knowledge of all markets, a choice can then be taken of those likely to give the most satisfactory results for future seasons. Neither grower nor salesman can make a market, but both can do a great deal that will assure good results—the grower by well packing and carefully grading and packing in neat and attractive cases, the salesman by studying the requirements of the market, and by his business tact and experience will often give fair returns on the worst of markets. Second quality should not be sent to distant markets except when prices are high, as freight and charges are as heavy on bad as on good fruit. Poor and indifferent fruit often lowers a market to such an extent that it is very hard to dispose of the real good at fair rates. In some cases if the first quality had only been sent it would realise as much as the poor and indifferent and good combined.

I am fully assured that 75 per cent. of the losses occur through the carelessness and want of tact of the grower, losses most of which could have been averted by a little care and thought.

Selling.—In some cases the grower prefers to sell from shop to shop rather than in the markets, which is a mistake when fully considered. It stands to reason better prices can be obtained where there are several buyers than when only one. This and the great saving of time more than compensate for the commission charged.

Selling at the orchard has also proved a failure, as a dealer is generally fully cognisant of the state of the market, consequently the grower is placed at a disadvantage. When markets are fully supplied the average dealer will not buy at all, thus the grower loses the good market and has to avail himself of a glutted one. Had he sent regularly to the market he would have had the good as well as being obliged to take the bad price.

Selling on Commission.—This is now the most popular and convenient, and, to me, the most practicable mode of disposing of crop. In the markets you find the buyers from many districts gathered. There practicable and efficient salesmen of long experience fully consider the stocks held and demand there is likely to be for such, the varieties and qualities most needed, and the disposition of the buyers. He not only knows the wants of his own particular markets, but being in communication with salesmen in the markets of the Commonwealth he knows their requirements and can thus often alleviate a glutted market. Should the agent be faithful, no other mode can be more successful than this.

Any person can sell an article when it is very scarce and needed, but none but a thoroughly practical salesman can make a fair market into a good one or a bad into a fair one. Hence if the grower is faithful in picking, packing, and grading, he will have little cause to blame the salesman or markets.

At present fruit culture is a successful industry in our State as well as in the whole of our Commonwealth. Its progress during the last few years has been great. Australian fruits are now known in the principal markets of the world. Successful fruitgrowing means a great deal to our people. It is a living to thousands now, and in the near future it will take a high place among the staple industries of our State.

THE ORANGE INDUSTRY IN THE MAROOCHY DISTRICT.

By F. J. Johnson, Palmwoods.

A FEW FIGURES SHOWING THE INCREASE OF THE INDUSTRY.

Mr. President and Gentlemen,—Considering the enormous strides the orange-growing industry has taken in the Maroochy district, and in fact all along the Eastern coast of Queensland within the past fifteen years, it was thought by the Palmwoods Fruitgrowers' Association, by whom this paper is endorsed, that it might be of interest to prepare an article on the mode of cultivation and the profits, &c., attendant on the crops in this particular district, as this is, without doubt, one of the districts most favoured for the culture of the citrus tribe to be found in the whole of the State. From statistics compiled in 1899, and kindly supplied me through the courtesy of the Department of Agriculture, I find there were in the Maroochy district 377 acres under

orange-trees; these were planted 20 feet by 20 feet; this will work out at 120 to the acre, thus giving a total of 40,716 trees. The average yield per acre was 314¼ dozens, and the total output for the year 129,801 dozens.

In view of the immense amount of trees which are being planted every year, also the large number which are annually newly bearing, and further the greater cropping capacity of the old trees, I think it may safely be said that the figures I have just quoted will in each instance be doubled in the course of a very few years.

THE WANT OF AN OUTSIDE MARKET.

Owing to the extraordinary area now under trees, the profits for the past year or two have not been considered perfectly satisfactory. This is due in a measure no doubt to the want of an outside market, but with the advent of a foreign outlet, and better facilities for the exportation of the fruit, it may certainly be looked upon as one of the State's principal items of cultivation, and more satisfactory profit to the grower.

The want of an outside market has been felt very keenly for several seasons, chiefly owing to the the reason I have just stated—viz., the young trees bearing and larger crops being taken off the old ones. Consequently there has been a glut on the colonial markets, thus causing a great falling off in the prices previously realised. If the trees are only given proper care and attention the crops taken off must certainly be profitable, as the demand will assuredly continue, and successful and general exportation may be expected in the very near future, and will have the desired effect of raising the present low prices.

It is not at all uncommon to realise £2 and upwards off a fully matured tree, and in many instances even more. This will go a long way to show what profit there is in the crop if the trees are only bestowed with the attention they require.

SUITABLE KINDS OF TREES TO PLANT WITH A VIEW TO THE FUTURE.

Having arrived so far, we will now consider which are the best kinds of trees to plant. As the tendency of the industry points to the exportation of the fruit, the kinds which are necessary for this purpose should have the preference above all others.

First, we will discuss the class of orange which will be suitable for this purpose, with respect to size, skin, flavour, crops, and profits. This opens up a very large question, and one which has of late been much discussed.

I have had much experience myself in connection with the orange trade on the English market, and the solution to my mind is not at all difficult to find.

The Washington Navel is a remarkably fine orange, and grows wonderfully well in this district, and answers to the principal characters required. It is possessed with a good firm skin, its flesh is solid, has a nice flavour, a fairly good cropper, and is of an extraordinary size; but herein is its only drawback, for on the general English market this is not required, but, as a novelty for high class shops and for decorative purposes, it would find a ready sale, and, I have not the slightest doubt, would pay remarkably well, but it must be thoroughly understood a quantity of this class of orange is not required.

Other varieties which have been known to carry well are the Sabina, which carried to London in 1887; the Mediterranean Sweet, Siletta, and the Valencia Late, which were tested last year, and proved satisfactory; but of those I have named preference should be given to the Mediterranean Sweet. Its qualities are all that could be desired, and it is indeed the very orange for the English market, both with regard to size and quality, and accordingly its respective commercial value; and I think no one need be dubious about its carrying satisfactorily, for its flesh is solid, and it possesses a firm and at the same time pliable skin. In addition to all these good qualities, it is also a good cropper.

Another very useful variety will be found in that known as the Federal, an orange of the Siletta type. This is not so well known as the others I have mentioned, but it is a really good orange, and possesses the characteristics required for exportation, and for that purpose I am inclined to think it will prove very satisfactory.

Another variety which must not be overlooked is the Valencia Late; this is a most useful orange, as it comes in when most other varieties are off the trees, and prices are naturally ruling high. It would thus be equally satisfactory on the English market, as it would arrive just before those from Spain could be put upon the market.

Now, a few words for our particular friends the hybrids of the St. Michael type. This is the class of orange which has made the district what it now is. It is a grand fruit in many ways, and recommends itself by its wonderful cropping capacity, and in many instances phenomenal crops have been known. This class of orange would

do well on the English market, but I am afraid it would not carry as well as the others I have named.

The outer skin of this variety is very tough, but between that and the flesh it is what is usually described as being raggy, and for this reason I fear it would arrive in a somewhat wasted and withered condition, much to the detriment of its marketable value.

Thus, having considered all things, I think the palm may safely be given to the Mediterranean Sweet, as being the coming orange of the future.

MANDARINS.

With regard to mandarins, there is one variety for the foreign trade which stands pre-eminent above all others—this is the Beauty of Glen Retreat. The flesh of this variety, and the skin also, are exceptionally sound for a mandarin. Mr. H. Smith, of the Montville nurseries, tested the carrying qualities of this variety last year, and found it did the journey to the old country exceedingly well, and kept in first-class condition for upwards of eleven weeks. This, I think, may be considered most satisfactory, especially when it is realised that there was no particular attention paid to the packing of the fruit.

Another variety which has only recently been introduced is one called Fewtrell's Shipping Mandarin, and raised by Mr. Fewtrell, of Palmwoods. This mandarin, when known, will be found worthy of a place in any orangery. The fruit comes in very early, and has been known to keep in good condition for upwards of four months. This alone will testify to its value for exportation. The first time this mandarin was shown it gained the first prize at an exhibition, where it was remarked that the mandarins were much above the ordinary standard, and it has again achieved the same success within the past few weeks.

Other useful types of mandarins, all of which are of first-class quality and flourish well in the district, are—the Emperor, the Scarlet, and the Canton.

All young trees of the varieties of oranges and mandarins I have mentioned can be procured from Mr. H. Smith, of the Montville Nurseries, *viâ* Palmwoods, whose trees can always be relied upon as being strong and healthy, clean, and true to name.

A FEW MEMBERS OF THE CITRUS FAMILY WHICH ARE GENERALLY THOUGHT UNPROFITABLE.

Before going further, I will just mention one or two members of the Citrus family which mostly seem to be somewhat disregarded from a point of profit. The first I will name is the Seville or Bitter Orange. This at the present time is the most profitable on the market.

The jam manufacturers vie with each other in procuring all they can get for the purpose of making marmalade, the demand for which is certain to continue. The general price paid last year was £14 a ton, or in other words 1½d. per lb., but how long this price will remain will be proved by the supply.

It should be stated that the Seville usually grown here is not the true variety, but I understand that this has recently been imported, and it is to be hoped this will be the means of distributing the variety, which is specially adapted for the purpose for which this class of orange is chiefly required. It would, therefore, be advisable for intending planters to wait until this kind is upon the market.

The Common or Rough Lemon is not usually considered very profitable, but it is not generally known that this also is in great demand by the jam-makers, large quantities annually being made into marmalade. It is more susceptible to disease than most of the Citrus family, but if clean and free from scale and a fair size it will prove very profitable.

The Citron would give a very satisfactory return, providing a quantity were grown. This is used for making preserved or candied citron peel, an article much used in England and on the Continent. I do not think the kinds mostly grown here would answer this purpose, as that used is generally of a much thicker and deeper skin. It seems incredible that, at the present time, large quantities in brine are annually imported into this country from Italy, and then prepared in the usual method, and then sold on the colonial market. Small quantities do not pay the grower, there being but little call in the market for them.

RELATIVE MERITS OF SEEDLINGS AND WORKED TREES.

There has been a lot of controversy of late respecting the relative merits of the seedling and the worked tree, and I introduce the subject in this paper in the hope that by debate we may arrive at a more definite understanding. There is certainly a lot to be said in favour of both.

The principal characters in favour of the worked tree is the earliness of its bearing, also its reliability of its being true to name, and further it does not grow nearly the amount of the troublesome thorns to which the seedling is naturally prevalent.

The seedling has its good qualities also, the principal being the size it attains and the consequent size of its crops, and again its wonderful longevity of life; but compared with the worked tree it has more detrimental qualities. The chief of these is that it can never be relied upon as favouring the parent tree; true, it may do so, but at the same time it may turn out a valueless mongrel. Again, the worked tree will bear several years before the seedling; in addition, there is always the troublesome thorns above spoken of to contend with.

Now, to consider anything detrimental to the ultimate value of the worked tree. First, it can never be expected to attain the size of a healthy matured seedling. Thus the crops can never be as large; and, moreover, will it always remain true to its working, or will it in course of years degenerate into its original stock?

We know the apple-tree will in time deteriorate, also the rose-tree, if not kept in constant cultivation. Is it not, therefore, possible as well as probable the orange-tree may do likewise? Of course I admit that the art of working the trees has got to a really wonderful stage; but, up to the present, they have not stood a test any length of time to show how long they will remain true.

To give an illustration: Suppose a young man in his twenties were to plant an orangery all of worked trees, and they answer satisfactorily until he was getting on in years. He naturally thinks he has made a good provision for his son; but, when the son takes possession, in a few years all the trees commence to deteriorate, or, in other words, go back. Well, it would, to say the least, be "rather hard lines on the son." I really think we should be prepared for such a catastrophe, and I would certainly advise intending planters to adopt an intermediate course—that of planting worked trees and seedlings alternately: one row of worked, the next seedlings, and so forth.

PLANTING YOUNG TREES—POSITION AND SOIL.

When planting young trees, a few of the following particulars may perhaps be found useful:—

The orange-tree likes a nice gradual slope with an easterly aspect, and if possible sheltered from the strong westerly winds.

They will grow in almost any soil, but that which suits them best is that of the nature of a red sandy loam with a good natural drainage. It is of the utmost importance that the soil should be well drained, for the trees will not thrive for any length of time in a soil of a stiff and retentive nature, although it is often noticed they will thrive exceedingly well in a soil of this description for the first few years, but apparently when the tap root touches the clayey subsoil, they invariably commence to turn yellow, and they gradually die out.

The best time for planting young trees is from the middle of March to the middle of April. This will give them a fair chance to take a hold of the soil before the cold weather sets in, and will also give them ample time to get thoroughly established before the hot weather arrives.

The ground should have been well prepared beforehand, and the holes dug at least three months previous to planting to allow the soil to get well seasoned.

In good soil, seedlings will require to be planted on a square of 30 feet apart.

Worked trees do not generally grow to nearly the size of the seedling, and can thus be planted much closer, 25 feet by 25 being mostly found sufficient.

In poor soil they can with safety in each instance be planted much closer. Seedlings, it will be found, will always do much better in a district where the oranges were grown and the seed raised than those which may be obtained from another part. It is also much better to obtain plants from a good stock, as they are not so susceptible to disease as any obtained from trees which might be infested. For this reason it would pay any grower who may happen to have a good tree to work his stock from the same.

Care should be taken when planting to place the young tree in the ground no deeper than it has been in the nursery bed, and it should be planted firmly with the roots well spread.

The orange-tree is a surface feeder, and does not, therefore, require to be planted to any depth.

NECESSARY CARE AND ATTENTION OF YOUNG TREES.

Having accomplished the planting, we will now turn our attention to the young trees as they grow. This is a matter of the greatest importance; for the first few years the trees require every care and attention.

A mistake which is often made is that of allowing the trees to grow two or three standards. In consequence, it is almost impossible to grow a well-formed and shapely tree. They should never be allowed to stand on more than one stem; and this should be topped so as to branch out at about 20 inches from the ground.

The principal object should be to induce the tree to grow a nice symmetrical shape. To obtain this, the centre of the tree should be kept fairly well open, and only allowed to grow such branches as will keep it evenly balanced and will help it to grow a nice shapely tree in the future.

If there are any symptoms of scale or any other insect pest, they should immediately be well syringed with a solution of common soda and Stockholm tar. Should any of the mixture, whilst spraying, be found to have run down the stem, and so reached the ground, the soil with which it has come in contact should be carefully removed and some fresh be substituted, or it may have an ill effect upon the roots. As the trees habitually grow very quickly, the ground around soon becomes somewhat impoverished, and they should, therefore, be helped on occasionally. Young trees cannot be assisted too much, and a good manuring now and then will have a marked result. This is a matter which is very often overlooked, and the trees, consequently, get weak and sickly; and this, in many cases, often conduces to the various pests to which they are subject.

If it is possible to keep 3 or 4 inches of soil always loose on top, thus allowing the moisture and air free access to the roots, it will be noticed they will thrive much better than if the soil is constantly caked and hard.

TREATMENT OF FULL-GROWN TREES—PESTS, CULTIVATION, PRUNING, &c.

When the trees have arrived at maturity and are giving their crops, it is to the interest of the grower to keep them in a healthy condition, and it is invariably a great help to give the ground a good sprinkling of lime and salt thrown broadcast occasionally.

In the summer, especially if it should be a dry season, it is a great assistance to give the trees a good mulching. Blade grass or fern litter will answer the purpose, or, in fact, anything which will form a mulch. This will keep the ground moist, and prevent them from withering when the heat is excessive, and it has been proved to be very beneficial. On the first approach of any insect pest no time should be lost in endeavouring to effectually stop it from spreading to other trees, for it is astonishing with what rapidity such pests as scale or white mite will travel from one tree to another, until, if not eventually stopped, there will not be a tree in the orangery, however large, which will remain free; and it behoves all growers to be perpetually on the lookout for any signs of the various pests to which the Citrus family are subject, for the size of the crops or the fruit themselves can never be a source of satisfaction or profit to the grower if the trees are continually in an infested state. Without doubt the cyanide treatment is the most effectual in the long run, especially if the orangery is a large one and the trees are a good size, but the first outlay for tents and other apparatus is so considerable that the small grower is not often prepared to obtain them, but I think this could easily be remedied if a number of small growers were to combine and purchase the necessary outfit between them; the outlay would not be felt nearly so keenly, and in such an event neighbours could help one another in operating. This is also a matter for local fruitgrowers' associations to consider, whose weight in procuring the necessary requisites would undoubtedly facilitate matters of of this description, and would thus render more pecuniary aid to its members.

In the event of neither of these schemes answering, the system of painting the trunks and branches and spraying should be given a trial; this by many growers is highly recommended, and in many instances has proved to be most effectual.

A good paint for the trunks can be made with 2½ lb. of sulphur and 2 lb. of slack lime being boiled in 2 gallons of water for one hour, or until sulphur is dissolved; then add 4 more lb. of lime and more water to make the whole up to 4 gallons.

A very simple wash for syringing the trees, and which is found most effectual, is prepared by dissolving 1½ lb. of common soda in 4 gallons of boiling water; then remove from fire, and add ¾ pint of Stockholm tar, and apply while hot. This mixture has been found a sure remedy for the destruction of all insect pests, and a test trial on the tenderest shoots resulted in no injury. The trunks should be painted at any time that the trees may happen to be infested, and spraying with the above solution may also be accomplished with safety at any period of the year except when in flower, but undoubtedly the best time for cleansing the trees is shortly after the crops have been removed, when they should be resting before they commence to make new wood.

If the above remedies are systematically practised, there is no visible reason why the trees should not always be in a clean and healthy condition.

Borers are another pest which cause a lot of trouble at times; these should always be looked for in the early morning, as the traces of their work are then more plain, and it is, therefore, generally thought that they must operate at night time. A watchful eye should always be kept open for them in wet months, when they are usually more busy than at any other period.

The general method of eradicating this pest is to prod them with a wire, and then to plug the hole up with soap, but the painting of the barks above described is ofttimes found to be a great preventive.

One of the greatest nuisances the orange-grower has to contend with is the orange or bronze bug.

The ravages of this insect in some seasons if not checked in time are indeed enormous. This pest's particular line of annoyance is to suck the juice from the tender shoots and the stalks whereon are the young oranges, causing them to drop off.

This year this pest was the means of destroying nearly the whole of the crop of a good many of my own trees before I was aware of its presence.

This is where the cyanide treatment is shown to advantage, as it destroys the larvæ of the insect as well as the pests themselves.

The system usually practised to dispose of this most unwelcome visitor is to tap the lower limbs, thereby driving them into the outer branches, where they can be knocked off with a stick and caught in a bowl of hot water held underneath ready to give them a warm reception.

This insect has a most undesirable habit of squirting a nauseous matter at any person who may be in proximity to it, and if this should enter the eyes it will cause intense pain; so the utmost care should be exercised to prevent this, for if any person should be treated in this manner by the said insect he will only regret it once, and that will be always. I speak from experience.

One of the greatest friends and allies the orange-grower has is a bird generally known as the Fan-tailed Fly-catcher. This bird will, in an incredibly short time, absolutely clear a tree of every bug there is to be seen. It is a sight worth watching to see it dart in and out from branch to branch, until it is satisfied there is not one left.

I will take this opportunity of warning those thoughtless persons who are always shooting every pretty bird which they come across. I am sorry to say this useful bird is shot in hundreds every year, and their wings and tails find a place in the hats and bonnets of fashionable ladies, and can be seen any time adorning the windows of high-class millinery establishments of London and Paris, and other large European cities. I do not think the trading in birds wings, &c., would be nearly so large if the ladies who wear them could only be informed how much they are robbing our hard-working farmers and fruitgrowers of their feathered friends, and of the consequent loss they sustain.

The ground around the trees should at all times be clean, and kept free of weeds, and if the trees have not been planted too close, the space between should be ploughed once a year. A plough that turns the soil right over should be used, and it is further advisable to cross-plough. Care should be taken not to plough too close, so as to prevent injuring the roots more than can be helped, and in the event of any being torn up, they should be neatly cut off, as they will do no good if placed in the ground again after being mangled.

A good coat of manure is necessary every year. Farmyard manure is undoubtedly the best for this purpose, and it should be spread just before ploughing, as it is then worked into the soil. In cases where the farmyard manure is not always procurable, the system of green manuring should be given a trial. This practice is much in vogue in some parts, and it may be stated with marked results. For this purpose, the Mauritius Bean and the Velvet Bean may be planted. These are both highly recommended for the purpose, and the manuring is accomplished by ploughing the growing crops into the soil. All kind of work such as ploughing, &c., should be done in the winter season, while the trees are resting.

The same time of the year any pruning that may be required should have attention. All water shoots and cross branches should be removed, and it should always be borne in mind to keep the centre well open so as to allow a current of air to pass through, but at the same time, what is usually termed the making of window holes in the trees should not be made unnecessarily, and all prunings should be immediately burnt.

The roots on occasions will also require a certain amount of pruning, for it will be noticed at times the small fibrous roots will become a thick mass, and will thus prevent a free passage of rain and air. Great care should be exercised not to injure the main roots, but a few of the smaller ones being removed occasionally will be found advantageous, and will in many instances promote a rapid growth of new wood.

A FEW HINTS ON PICKING AND PACKING.

A few remarks on the picking and packing of the fruit may perhaps be found useful. Many growers do not seem to regard this branch of the industry to be worthy of particular attention, but it is certainly a matter that should be taken more notice of, if only for their own interests. It is not an uncommon sight to see the fruit being knocked off with poles, and the branches shaken, and various other devices are used to save trouble, needless to say much to the detriment of the fruit. Oranges which have been carefully picked will keep in good condition for many weeks, whereas if they should happen to be bruised or in any way damaged will last practically no time, thus it can be plainly seen that the careless packing is in many instances often the cause of unsatisfactory market results.

The most satisfactory manner of gathering the fruit is to cut them off, but the stalk should be cut as near as possible to the orange, otherwise they may be damaged in the packing. Where the trees are a fairly good size, it is not always possible to get near enough to the fruit on the outer branches to cut them; the picker in such cases must resort to plucking, by giving a slight twist they can easily be removed without being damaged. A case well and closely packed without injury to the fruit, and in new and clean cases, will invariably command a better price than those packed in a slovenly fashion and in old and dirty cases, no matter how good the fruit may be.

Every grower should have his own brand, and if the fruit is good, buyers will naturally look for that brand; thus a good article recommends itself, and will command its price accordingly.

A practice which unscrupulous persons often resort to is that of placing first grade fruit at the top and bottom of a case, and second grade in the centre. This is a most pernicious system, and one which cannot be too strenuously condemned, and it certainly results in no benefit to themselves, for buyers will remember such a person's brand and cases, and as a well-known fruit salesman sagely remarks, "They are only taken in once."

THE WANT OF A STANDARD CASE, PACKING SHEDS AND DEPOTS, AND A SUITABLE CASE FOR EXPORTATION.

A great want at the present time is a uniform or standard case. Oranges are now sent to the markets in all sorts and sizes of cases, and the results of sales are ofttimes most unsatisfactory to the sender. So long as it is a case, buyers are apparently satisfied, and a fair-sized case invariably realises no more than one which contains one or two dozen less.

The sooner this matter is taken up by fruitgrowers' associations and others concerned the better it will be for all interested in the industry.

While on the subject of cases, I might remark that a suitable case for exportation will shortly be needed, and I trust the Department of Agriculture will not think I am taking a liberty if I should suggest that the difficulty might be overcome by the said Department offering a prize at some forthcoming agricultural exhibition for a case possessing all the characters required, which will be suitable for the successful exportation of oranges.

A short time ago I was present at a show where a private person offered a special prize for a case of oranges specially packed for exportation. There were a good many entries, but I do not think there could have been one of the competitors who thoroughly grasped the object for which he was competing, for all the cases were heavily made, and each piece was nailed closely to the next, so that when the lid was fastened down the case would be practically air-tight. The result of sending oranges away in a case of this description would be that, before they had been on the water many weeks, the majority of the contents would be absolutely mouldy, owing to there being no current of air through them. I have seen many consignments of oranges arrive in such a condition when the oranges were first sent from New South Wales, and I might add that the same mistake was made in several instances which came under my notice. Not only that, but the cases I speak of only contained about a hundred oranges. Thus it will be plainly seen that to export oranges in such a manner would be perfectly useless, when it is remembered that many business houses each sell scores of cases of oranges daily, each case containing the regulation 420 or 714 oranges, more or less.

A case which will only answer satisfactorily for exporting must be comprised of the three principal requisites, viz.:—First, weight must be borne in mind; it should be strongly, but lightly, made. Secondly, it must have a thorough current of air; and thirdly, space must of all things be considered. The class of case at present used on the colonial markets is in every way totally unfit for the purpose of exportation.

In view of the amount of oranges annually put upon the market, I think the time has certainly arrived that there should be better facilities in the way of sheds and depôts for the purpose of cleansing, grading, and packing. This is also a matter of the utmost importance, which should be taken up unanimously by the growers themselves, and all associations connected, and could easily be met by all amalgamating to further the object; and I sincerely trust the time is not far distant when the necessity of such an introduction will be seen by all who have the welfare of the fruit-growing industry at heart, not only in the district, part of which I have the pleasure to represent, but in the whole of the fruit-growing districts of the State.

DISCUSSION.

Mr. JOHN WILLIAMS (Mount Gravatt): Mr. Cooksley touched upon worthless trees, and there is no more important matter at present in connection with the fruitgrowing industry. It is a standing disgrace to us, and to the farmers in particular, that this thing goes on. We cannot blame the farmers altogether. Their natural vocation of tilling the soil instils into them a heaven-born innocence. A gentleman goes about with pictures, and catches the farmer at the tail of the plough. The farmer sees the pictures, and is clean gone over them. Although the traveller puts a big price on them, he tells the farmer he can have four months in which to pay, and he generally gets an order. There are none of you farmers who would buy a horse on the strength of a picture, and yet many will buy trees with but nothing else to guide them. Mr. Johnson touched very well upon citrus trees. There is one point that should not be lost sight of in connection with citrus culture, and that is the advantage of sending early oranges to catch the Southern markets. We can do a great deal in that direction.

Mr. L. G. CORRIE (Brisbane): I thoroughly agree with Mr. Rose in his position for a pineapple orchard; but I hardly agree with what he says about manuring. The so-called diseases are largely due to difficulties of drainage or poverty. One point to which sufficient attention is not given is the selection of plants, a great many people paying very little heed to it. There has been a lot of in-breeding in Queensland, and it is a wonder our pineapples are as good as they are. In Florida, owing to the cold snaps, they have to grow most of their pineapples under bush-house shelters. The Ripley Queen there develops a disease known as Ripley Spike, the plants having a tendency to sucker instead of fruiting. One man planted a certain picked lot of plants, as well as some ordinary ones. The result was, when an officer of the Department of Agriculture came down to have a look at them, that from the selected plants only 4 per cent. were showing this difficulty, and of the other plants 60 per cent. This shows there is something to be gained by the selection of plants. The low price of pineapples is probably due to want of proper distribution. At our last conference, I saw in Warwick smooth leaved pineapples which had been imported from Sydney. The person who was selling them could not tell me where they had originally come from, but I was inclined to think that they were Queensland pineapples that had reached Warwick *viâ* Sydney. Of course they might have been Island pines, but still I think they came from this State. I would have liked Mr. Cooksley to have referred to nuts and olives in his paper. Central packing-houses are most desirable. We want a lot of one class of thing. We want a district to try and stick to one class of fruit. Little shipments will be of no use when you want to deal with fruit on commercial lines. There are lots of places in Queensland to which fruit does not reach, and canning, therefore, even for the requirements of a number of our own people, is very desirable. I take it we shall have a better market for our fruit now that intercolonial freetrade is coming. We have fruits they cannot grow elsewhere, and those fruits should be a specialty for Queensland. As for mangoes not being liked in Sydney, I think that has arisen through bad sorts having been sent down. If any of you are going to Brisbane, I would advise you to look at the fruit cases that have just come to the Department of Agriculture. I had my eyes opened when I saw them. They are good

samples of the fruit case used in the American trade. We do not want to offer a prize for the best case, as we have it now, and only want to use it. I think Mr. Johnson's £2 per tree cannot be considered an average case. I am glad to hear the Navel orange is doing well in his district, as I had something to do with its importation into Queensland. The question with the Navel orange is whether it will bear well. In Florida, in the United States, it seems to be shy, but in California it is said to do much better. Too much attention cannot be given to the subject of bird protection, and the Acclimatisation Society have been trying to get the Native Birds Protection Act put into force. We got a conviction the other day, and, although it caused us a lot of trouble, that one case did a great deal of good. If fruitgrowers' associations would take similar action, much benefit to the industry would result.

Mr. G. Turner (Bowen): It is my intention to submit a motion to the Committee of Resolutions, asking that a deputation wait upon the shipping companies relative to the carriage of fruit. One grievance at present is that they will not allow 40 cubic feet to the ton, and another is the pilfering of fruit by passengers and crews. The Carriers Act might compel them to take some action in that respect. There is another motion to be brought up, dealing with the flying fox; and we have a third, asking for assistance to procure cyaniding plants for the clearing of trees or other towards any system that will act the same as cyaniding. It is rather too expensive for one man to buy a cyaniding outfit, but, with some little assistance from the Government, a plant might be secured and become of great assistance to a district. My district has one other little grievance, Mr. Chairman. Bowen has been a fruitgrowing district as long as I can remember, yet Mr. Benson, your Fruit Expert, has never been there, although repeated applications have been made for his services. I find he is constantly going to other districts, and I think we have a claim to a visit from him.

In reply to a number of questions, Mr. A. H. Benson (the Instructor in Fruit Culture) said: I do not think you need have the slightest fear of the deterioration of worked trees. In a work on the orange, published in 1804, there are pictures of varieties of oranges that are growing to-day. As for one gentleman's Glen Retreat oranges being a little bit coarse, it is because they are young trees growing on new soil. When the trees get older the fruit will get better. Fruit from young trees on new soil will always be more or less coarse. I have been using caustic soda, Stockholm tar, and whale-oil soap, and have found it a very good remedy. It is much the same as the old Californian resin and soda wash. There is this difficulty about it: You must not use it on your fruit when it is ripening, as you will stain the fruit. Roughly speaking, the standard American fruit case could be landed here, with the freight, but without the duty, at about 6d. The grape slice is a crate holding four small layers of grapes of 5 lb. each. It could be landed here at about 6d., including the "slices." You can pack such things as grapes in these slices, and they go direct from the orchard to the consumer without being handled by the middleman. The result is that, instead of your fruit keeping three or four days, it will keep seven or eight. If you could erect a building in the shape of a perfect cube you would have the strongest structure in the whole world, and the nearer you get your fruit case to the cube the stronger it is. These American cases are practically 2 cubic feet. There are really two cases of 1 cubic foot each. Most of you gentlemen know the case that is sent from Sicily and Southern Europe. Well, the one the Californians are using is practically the same case. If you are going to ship to London you must have a tight case. Mr. Johnson says a ventilated case; but if you have too much ventilation in your cases, too much air passes over the fruit and the skins will shrivel. Cure your fruit before you pack it, and then the fruit will travel from one end of the world to the other. The first fruit sent from New South Wales to England was pulled from the trees, jammed into cases, and was bad before it left Sydney. Just before I left New South Wales I was instrumental in sending the first successful shipment of oranges to England. We shipped

1,800 cases, and the average return was something like 11s. a case. This fruit was purchased by the New South Wales Government from the wholesale merchants. We paid all freights and charges, and had a net profit of something like £130 on the transaction. Any wholesale fruit merchant who deals with the lemons from Sicily will tell you that the lemons arrive here in tight cases. In 1894, at Mildura, I brought up the question of a standard fruit case, and have done so at every fruit conference. There should be a standard measure for the sale of fruit, just the same as we have a bushel of wheat or a gallon of milk. We must have a standard capacity for fruit, and the sooner it is made law throughout Australia the better. At all the intercolonial fruit conferences we have been unanimous in the desirablity of having a universal standard case. It would already have been made law in New South Wales had not a number of those for whose benefit it was introduced blocked it. I want to tell you what I expect you fruitgrowers to do. You see the sugar-growers in Queensland are forming their one solid organisation for the benefit of their industry. Your industry is going to be a big one; and the sooner you are all bound together, the sooner you will get a standard fruit case, and the sooner you will get the work you want. When you all pull together I, as the Fruit Expert to the Government of Queensland, will be able speak with those in authority over me with a certain amount of power, because I shall have the industry behind me. I feel we are now in a kind of transition stage. We have practically reached the limit of consumption in our own States, especially as far as Queensland is concerned, and the time is coming when we must open up new markets. We shall never be able to compete in those markets unless we compete as a body of fruitgrowers in a systematic manner. We are coming on to markets where the growers have had control of them for many years. If we have to get a share of that trade it behoves us that we must not only put our fruit on those markets as well as those who already there, but a little bit better. We have the quality of the fruit in Queensland, and we can make a name for it. Mr. Williams referred to the question of drawing the attention of fruitgrowers to the vast quantity of inferior fruit trees introduced into the State. I have brought this matter up hundreds of times, and yet over and over again farmers get taken down by men coming round with books of pictures. You should know these things. Many of these trees are undoubtedly good trees for the Southern climate, but they are not adapted to our climate or our climatic conditions.

Mr. D. JONES (Inspector, Diseases in Plants Act): I would just like to mention this fact in connection with the flying fox. From my own observation in the West Moreton district, where the disease is prevalent, I know that the pink wax scale is carried about by the flying fox. With regard to the proneness of people with English ideas to carry the sparrow with them into their own district, I may state that a bird fancier has told me that he has orders for sparrows from Charters Towers, and that he has supplied them to that town. In the Moreton district, sparrows are a great menace to the fruit industry, small fruit more especially being subject to the attacks of these birds. Once you get the sparrow, he is as hard to eradicate as any other pest. There is a matter which affects our friends from the Blackall Range, and that is the insectivorous bird question. I am informed that at times a number of our birds are very partial to strawberries, and do a lot of harm. A case was before the courts quite recently with regard to a prosecution under the Native Birds Protection Act, and I may state that I consider action under this Act is one of those things that requires discrimination. I understand the prosecution was against a man who collects birds for shipment to the South to be made into lark pies, and I am informed he had about 3 tons of birds in cold storage ready for shipment to the South. There are many birds which we should encourage men to get rid of. I quite believe that, after this prosecution under the Native Birds Protection Act, that man will not now seek to make a commercial commodity out of what to many fruitgrowers on the Blackall Range is a nuisance. I can assure all fruitgrowers that a great

deal of the profit in fruit lies in the appearance of the case. A buyer is always suspicious of a bad case. You may think it is of no moment, but I know of fruit packed in nice clean cases that realised fully 1s. a case more than similar fruit packed in inferior cases. In connection with my duties as inspector, thousands of cases of fruit pass through my hands; and I can tell you that I am quite in accord with my friends of the market in their cry for better cases and better packing. It is heartbreaking to a man to have to sell badly packed fruit. With regard to the standard fruit case: I think we shall agree upon a standard size of case when we agree upon the nomenclature of fruit. When Mr. Johnson mentioned 700 oranges in a case in the home market, the statement was received with apparent surprise In a copy of the Liverpool *Produce Markets Review*, which I have before me, I see references to 420 and 714 Valentia oranges in a case. You get them there as low as 7s. 6d. for 130. I just mention this to show what you will have to confront when you send your fruit across the globe. There is a limited demand and a limited period during which you can make the high prices mentioned by Mr. Benson. I do not know whether you could send bananas to Liverpool or not, but I see they sell there at from 6s. 6d. to 7s. 6d. a bunch.

Mr. A. T. Coomber (Bundaberg): There have been a great many varieties of oranges shown this afternoon by Mr. Johnson, and I would just like to mention that the Mediterranean Sweet has not been a success with me in this district. I simply say that for the information of those present. Mr. Johnson speaks about planting 120 orange-trees to the acre. To plant 120 trees to the acre, in my experience, would be a mistake. It would be too close, and fifty trees to the acre would probably be better. I think it is always best to plant on the square, so that you can get your horses to work the ground at a cheap rate. I have with me a new mandarin that I did not discover until a few days ago. It is the first time the tree has borne, and I would like to introduce it to the Conference. For carrying qualities I do not think there is anything that could beat it. I have been engaged in the commerce of fruit as a buyer, and have often got cases from all parts of the world. My idea is that the Italian case is very suitable for export, and it has proved so by the way the lemons arrive here. Of course, as Mr. Benson has remarked, the lemons are properly cured before they are packed. Some years ago I used to take a delight in taking citrus fruit to shows. I used to pull my oranges two or three weeks beforehand, wipe them every day, and their appearance on the day of the show generally managed to secure me the prize.

Mr. J. Rose, Junr. (Woombye): I am glad my paper was well received. With regard to what Mr. Corrie said about manuring, I may state that only about two weeks ago I had a visit from Mr. Smith, of Geebung, and he said that with all the manure used in the Zillmere district there were no pines there that looked so well as mine.

Mr. W. P. Cooksley (Brisbane): I have to thank the gentlemen present for the courtesy they extended to me during the reading of my paper. My friend, Mr. Rose, gave us a very good paper on pineapple culture, but I have yet to learn that it takes eighteen months for a pineapple to bear fruit. Of course it might on the North Coast line, but it is not so with us about Brisbane. I favour the style of case for oranges mentioned in my paper read at the Warwick Conference. I do not think you could have a case for oranges better than the case used by the Messina people in sending their oranges to Australia. They are all pretty well airtight. All the fruit are, practically, hermetically sealed in with paper, and they arrive here in splendid condition. Mr. Corrie wished I had put in something about olives and nuts in my paper. Olives and nuts—nuts more especially—are well known to everybody. I sampled a pickled olive last night after dinner, but I do not think we would care much about it as a fruit. A gentleman said the best mode of treating citrus trees was by cyanide. It might be, but I have in my mind's eye an orchard, and a very extensive one, where cyanide is not known. Yet they have no scale there.

They do not allow the scale to live two days, and it is never killed with cyanide. It is done with kerosene and cold water. They never heat the kerosene. It is very much cheaper than cyaniding, which is very expensive. It has to be done at night when no dew is falling, and it was only the other day that the cyaniding plant had been lying, not for a week or a month, but for three months, unable to go on with its operations owing to dews and rains.

Mr. ATTHOW (Brisbane): My point was that, if by some method or device, fruit sent to the market could fetch a 25 per cent. higher price, it would pay the fruitgrower and increase production. That could be done by judicious picking, packing, and marketing. I give you no theories. The point is that I wish you to market your fruit now, not with these theories of cases, for they will come later, but with the present wants and necessities of the markets in view. A large firm had printed some thousands of almanacs set up in Chinese. The whole lot were left on their hands, however, because the groundwork was green, a colour the Chinaman does not like, and I just quote this to show what a little it takes to make or mar a market. We must place our fruit on the market as it is needed. Let it be done simply and well.

Mr. F. J. JOHNSON (Palmwoods): The main point of my few remarks will be to thank those gentlemen who have answered the questions I wished to find out. I maintain that the Maroochy district is one of the best for the culture of citrus fruits. I noticed that some gentlemen seemed to take exception to my remark about the Spanish case containing from 400 to 700 oranges. You can believe me there are plenty of such cases seen daily in Liverpool. England is to be our market, and the sooner we can get there the better. Mr. Jones quoted some low prices prevailing in Liverpool, but he did not say whether they were Spanish or Queensland oranges.

Mr. JONES: Messina oranges.

Mr. JOHNSON: Queensland oranges, I have not the slightest doubt, are the best in the world. I do not believe that any of those oranges you see on the table can be exceeded in quality by any in Spain. Queensland oranges would arrive on the English market just at the time oranges are required—namely, in the hot months. Queensland oranges would then be at their prime. As to the merits or demerits of cyaniding, that is a question that I shall leave to Mr. Benson.

In reply to Mr. Ridley, Mr. BENSON stated he had been to Sydney on the subject of the cyaniding of oranges, and he trusted that arrangements would be made by which the present regulations insisted on by the New South Wales Government might be modified.

The Hon. D. H. DALRYMPLE: I think we must compliment the readers of the essays upon their high quality. They dealt with the orange-tree, its growth, its pruning, its culture, the preparation of the fruit for market, and also the result in sending it to other parts of the world. I think if we had time perhaps these gentlemen would be entitled to a vote of thanks for their excellent papers. One speaker said Bowen had not been visited by the Instructor in Fruit Culture. I shall bring the matter before Mr. Benson's notice privately. Mr. Benson spoke of the necessity for having a law to impose a standard measurement upon the fruit cases which were shipped from the State. That might be advantageous. I presume it is so, or else Mr. Benson would not have recommended it. But I would point out that no legislation on the subject has been successful in any of the Southern States. Mr. Benson told us that the reason it was thrown out in New South Wales was because the fruitgrowers themselves were not disposed to have it. I can only say that, if I thought it were desirable to bring forward a regulation for the purpose of putting coercion upon the fruitgrowers and compel them to make their cases in a particular fashion, I think I should lack justification if the fruitgrowers said they did not favour it. The only justification seems to me to be an almost unanimous desire on the part of the fruitgrowers. Such a law does not appear to exist in Australia, and I should like to ask Mr. Benson whether it exists in America,

in Italy, in Spain, or in any other fruit-growing countries. It seems to me that, if a fruitgrower persists in sending his fruit to market in a box which, he is informed by his agent, is a commercial mistake, he will, perhaps, be cured by his finding out that his folly results in the penalty of lower prices.

NINTH SESSION.

Friday Evening, 14th June, 1901, 7 p.m.

Proceedings commenced by the submission by the Committee of Resolutions of the following resolutions and recommendations. They were all adopted by the Conference :—

Future Conferences.—Printed Papers.

With reference to the suggestion that at any future conference all papers to be read at such conference should be in the Agricultural Department's hands not later than one month before such conference takes place, and the Department to have such papers printed so that they be available for delegates, the Department using its judgment as to the selection of papers, that the attention of the Agricultural Department be drawn to the suggestion.

Time-limit.

With reference to the resolution submitted by Mr. Biddles, "That in the opinion of this Conference it is advisable that at future conferences the time allowed for reading a paper be limited to from fifteen to twenty minutes, as the discussion of a paper is invariably more instructive than the paper itself," we have to report that, while we are in sympathy with the time-limit, we do not at present see our way to recommend any definite plan of shortening the length of the papers, but trust to the good taste of the writers.

Subsidy to Fruit Associations.

That the Government be requested to subsidise fruit associations to the extent of £1 for £1 in the purchase of cyaniding plants or other approved appliances for the extermination of pests.

Water Hyacinth.

That the water hyacinth be declared a noxious weed under the Act, and that facilities be afforded local authorities to cope with this pest.

Central Sugar Refinery.

In view of the adoption of a uniform tariff under federation throughout the Commonwealth and the possibilities of a protective tariff, we recommend that Mr. Roberts' proposal for the establishment of a central sugar refinery stand over till the next conference.

Railway Freights on Wheat and Flour.

That the railway freights on wheat and flour to port, and to all places between the place of production and such port, should be reduced to the same level as such are on the New South Wales railways.

Dairy Inspection Bill.

That it is desirable, in the interests of the dairying industry in Queensland, that a Dairy Inspection Bill be submitted to Parliament at an early date, and that the administration of such a Bill be carried out by the Agricultural Department.

Flying Foxes.

That the Department of Agriculture be requested to assist the fruitgrowers to discover some means by which flying foxes may be effectually exterminated, and we further recommend that, where necessary, joint boards be formed and subsidies granted by the Government to assist such boards in this work.

Holiday for National Association's Show.

With regard to the list of holidays proclaimed by the Government, and the proposal that the opening day of the Queensland National Agricultural and Industrial Association's Annual Show be included in the list, we consider that the matter is outside the scope of this Conference.

HOMESTEAD SETTLEMENT.

That, to encourage *bonâ fide* homestead settlement, we recommend that further facilities be granted to such class of settlers, and that selection by absentees and baliffiing be discouraged. We further recommend that road and water facilities be safeguarded, and selection before survey be discouraged.

CHAMBER OF AGRICULTURE.

That the formation of a Chamber of Agriculture is advisable, and we recommend that this Conference select a committee of ten (who should be representative of the various producing industries) as a provisional executive to arrange for a meeting of delegates from the various societies to be held at Brisbane at as early a date as possible; and we further recommend that the gentlemen whose names we submit should be nominated as such executive:—

Sugar—J. Stodart, M.L.A., and J. F. Howes.
Pastoral—J. Cameron and T. de M. Murray-Prior.
Agricultural—F. W. Peck and Thos. Burgess.
Fruit—L. G. Corrie and C. Atthow.
Dairying—A. Wagner and A. Robinson.

SORGHUM POISONING AND SWINE FEVER.

That the matter of sorghum poisoning (treated of in Mr. Coulson's paper) being of such vital importance to the dairying industry, we are of opinion that the Agricultural Department should be asked to deal with this question as one of great urgency; and we further recommend that inquiry be made into the question of swine fever.

THE CARRIAGE OF FRUIT.

That a deputation, of which Mr. Corrie will be convener, be appointed to wait on the shipping companies to request that due allowance be made, as was customary some years since, for all ullage of fruit in transit, and that should this measure fail the Government be requested to amend the Carriers Act so as to secure the desired end.

ADVANCES TO SETTLERS.

That the question of an Advances to Settlers Bill is worthy of the serious consideration of the State Parliament, and we trust that such a Bill will be introduced during the coming session.

WORTHLESS SEEDS.

That a Seeds and Plants Bill be introduced before Parliament next session.

NUT GRASS.

That a substantial reward be offered to the discoverer of some practical means for eradicating nut grass, that would be innocuous to soil and stock, and which would repay the cost of the operation.

QUARANTINE LINES.

That Mr. John McPherson's proposal that stock should be allowed to cross the present quarantine line after taking proper precautions by dipping to prevent ticks being carried, and that, if New South Wales wants an absolute buffer area, it establish the same in its own territory, be recommended to the earnest consideration of the Agricultural Department.

CHAMBER OF AGRICULTURE.

Mr. T. DE M. MURRAY-PRIOR (Maroon) announced, in connection with the resolution that had been passed relative to a Chamber of Agriculture, that steps had already been taken to definitely inaugurate the scheme. Ways and means were, of course, wanted, and the contribution had been fixed at 5s. for the present. He asked every delegate who was in favour of the scheme to communicate with him.

CONCLUSION.

The Hon. ANGUS GIBSON: We have arrived now at the end of what I think must have been, to most of us, a very pleasant work. Some have given their maiden speeches in fear and trembling. Some have appeared on the platform here as if they had been to the manor born. Some have said very wise things; a great many, very foolish ones. Mixing altogether I think that, generally speaking, the whole surroundings of the Conference have been very

satisfactory. We have had many things of an educational character. We have had much that was amusing. We have been delighted that the men from the far North met the men from the far South-west. We have been delighted that Brisbane has been here and met Bundaberg, and that we have come to Bundaberg in such a compact body, with such smiling faces and with such beautiful thoughts, one towards the other, that it must have been gratifying to everybody to know that we have such an association that has brought the producing elements of this great State together seemingly as one man. We have hardly been divided on anything, except that each man who rose thought he could work out the problem better than the speaker who had just left the platform. In a multitude of counsel it is said there is much wisdom, and I am sure that in the variety of topics that have been introduced there must have been some that everyone will carry home with him. I am delighted to know that this association is growing in power, growing in influence, growing in grand ideas that are to make not only this State of Queensland one of the first States of the Commonwealth, but be educational in their influence on all the other States of Australia. We might have waited longer and done more. Our duties demand that we, generally speaking, retire to our homes. We shall have pleasant memories, I trust, of the faces we have met, of the conversations we have had, of the surroundings that we have been mixed up with, and of the many ideas that have become new to us and which we never understood before. Among many things we have met with and took some pleasure in and have been pleased to meet, was the Chairman of the meeting. He is new in this position; but he has appeared old when he had matters to explain to us when we had all done. Very wise counsel, very opportune remarks, very clear ideas were put to us in the summing up of many of the papers which came before us. It is wonderful, gentlemen, how the world goes on. We sometimes think, when an event happens, that that will be the end of time. But it is not so. Our fathers have gone; our surroundings have gone and new surroundings come, new men, new ideas, new duties. The Chairman is not new to us, though he is new to the position. We think of the old friend that is gone. That is all we can do, and I am sorry that we have lost a good man. But we are pleased that the State of Queensland has had a gentleman who could so worthily take up his position. The Hon. Mr. Dalrymple has filled many positions in the State, and I am delighted to know that there was a time in his history when he was not a member of Parliament, when he did not possibly aspire to be one, and when he was using his hands and limbs and mind at his work like you and me. And it is pleasurable for us to know that many of our leading men started very low down in their vocations of life and have risen to the positions they hold to-day. I have thought, while I listened to many of the remarks which were passed by the gentlemen who stood here, that some day their names would be seen among the men who will be making our laws in our Legislature, and I am hopeful that we shall see more of the agricultural element in our House of Assembly. In Mr. Dalrymple we have a gentleman who understands our wants, who sympathises with us in our needs, and who, I feel sure, when he gives expression to a thought, will endeavour to help to carry it out if the Treasurer can assist him. I do not want to take more of your time. I am very pleased to say kind words concerning the gentleman whom we wish to honour. In the House of Assembly there is no more concise debater than the Chairman of this meeting. I am not going to hurt anybody's feeling, but I know in politics when certain men sit down and think there is nothing more to say they are more than astonished when Mr. Dalrymple gets up. I shall ask you to join with me in giving our honourable Chairman a hearty vote of thanks.

Mr. L. G. CORRIE: It is with pleasure that I rise to second Mr. Gibson's proposition. It is not necessary for me to dilate upon the fact that Mr. Dalrymple has given satisfaction. Every delegate in the room knows this! To some little extent it is fitting that I should speak. Having had some

considerable experience with conferences of various sorts, I can sympathise with the chairman's position. As I pointed out in my paper, at the end of a conference it will generally be found that the chairman has done quite the hardest work. When I was coming up by train to this Conference, upon glancing through the syllabus, it seemed to me impossible that such a huge programme of business could be put through; yet, the Chairman has done this, and it is the more remarkable when we know that this is his first experience of the kind. I desire to congratulate the Minister upon the capacity that he has shown. He has been firm when it was necessary to make a stand, and at the same time has made allowance where a little license was desirable. In conclusion, I would point out to my brother delegates, especially the younger members, how it is quite possible, as in Mr. Dalrymple's case, for a man not a lawyer by his own exertions to advance himself and become so qualified by his parliamentary and other experiences as to be able to occupy any position in the State with credit.

The Hon. D. H. DALRYMPLE: I feel heartily glad that I have succeeded in obtaining your approbation. The task has been a most easy one, and I can take no credit for it. It is very easy to be good when you have got good people to deal with. I think that a feeling of kindliness and a feeling of consideration which are shown by a number of persons must beget consideration to others in any other person unless he is unfit to be a member of human society. I was rather afraid of coming to take charge of a conference. I knew there were a number of gentlemen whom I did not know. I knew that my predecessor was an exceptionally capable man, and I felt, that in taking up the position, I probably had been preceded by a better Minister, and one whose equal it will be difficult to get in a considerable number of years. It is a fact that, generally speaking, the speeches have been very instructive. They have been delivered with no view, I believe, of self-aggrandisement, as we frequently find outside conferences. There was no desire at all to take up any part in the public eye, but there was merely the single intention of delivering some information which it would be to the interest of the general agricultural public to listen to and discuss. The subjects have been well chosen. The divisions of opinion which occasionally arose have all been of the most kindly nature. It has been absolutely a perfectly ideal debate. There have been no personalities, and the best possible feeling has been displayed by all members of the Conference. I did apprehend probably that I should not be able to perform the task that fell before me. But I found, in this case, that the path of duty was positively coincident with that of pleasure. As a rule, we do not get much in this world without much hard work, and, if we want any pleasure in the next world, we generally have to give up a good deal in this. We generally have to buy pleasure. I have had the greatest possible pleasure in attending this Conference, and if I have done any good whatever I am extremely thankful. If we have got along in the Conference, whatever my good friend Mr. Gibson may say, I am too old to believe that the result has been arrived at in any wise whatever but from the general good feeling and desire to act for the common good. So far as you were good enough to attribute to me any credit whatever, I can assure you I am heartily grateful, for, after all, the best possible reward any public man can hope for is to have the approbation of those of his fellow-creatures with whom he comes in contact. There is one duty I must perform. It is usual on these occasions to propose a vote of thanks to the officers of the Department of Agriculture. I do not wish to extol their virtues, because I believe that good wine needs no bush, nor do I believe that good men deserve any praise to make their virtues apparent. They will stand on their own merits, and I have no hesitation in saying that a great deal of good has been done by the experts of the Department, who really are the fountains of the information which we have to depend upon. I say that Mr. Benson and all the other gentlemen have been of great service. I believe they will be of greater service in the future, and I am glad for you to know that we have also Dr. Maxwell, who is a new servant of the Department, and whose knowledge and experience

will be placed at your disposal, as the knowledge and experience of the servants of the Department have been placed hitherto. I may say of these gentlemen that they do not work as men work merely for a pecuniary reward. They are thoroughly zealous servants, and their desire is to make a success of every department of which they are in charge. They do good for its own sake. I ask you to acknowledge in the way you deem most fitting the merits of these gentlemen upon whom so much depends, and who, I thoroughly believe, are zealous and honest workers.

The vote was carried amidst applause.

The Hon. D. H. Dalrymple: The secretary, I am sure you will know, has been a most efficient and zealous officer. If I had an hour I am sure it would not be too much in which to portray Mr. McIntosh's excellences. He is known to you as one who has worked without any hope of reward, and because he has done so I ask you to give your approbation of a very worthy and zealous gentleman.

Mr. T. Burgess (Forest Hill): I have had a little to do with public men and have seen hospitality displayed to men attending conferences, but I have never seen a man who so did his level best to give pleasure and enjoyment in the way that Mr. McIntosh has done. I am sure I endorse the sentiments of everyone present when I class him as a regular brick. (Applause.)

The evening concluded with a smoke concert tendered to the delegates by the Bundaberg Council of Agriculture. Occasion was taken during the evening by Mr. C. J. Pound, the Government Bacteriologist, to give a popular lecture, illustrated by lantern views, on tuberculosis and other matters, comprising an extensive series of specially prepared lantern photographs, demonstrating the methods of detecting and studying the tubercle bacillus; its cultivation in and upon various artificial and natural media; the preparation and diagnostic use of tuberculin; specimens of diseased tissues and organs; how tuberculosis is spread among cattle, pigs, and other domesticated animals; and the most modern methods for its prevention. The lecture, which was both interesting and instructive, was highly appreciated by the delegates. A presentation was also made by the members of the Conference to Mr. Adam McIntosh as a token of their appreciation of the work and arrangements carried out by him for their comfort during their stay in Bundaberg.

On the following day, at the invitation of the Isis Agricultural Association and under the charge of Messrs. T. H. Wells and H. Epps, a large party of the delegates visited the Isis, and were all greatly delighted with the splendid nature of the country and the kindness with which they were received by the people of the district.

The following paper was prepared for the Conference, but, notice of it having arrived too late, provision for its being read was not made in the programme:—

THE NECESSITY OF COLOURED LABOUR, PREFERABLY SOUTH SEA ISLAND, FOR CANE CULTIVATION IN NORTH QUEENSLAND.

[By W. C. Miller, Macknade Farmers' Association.]

The subject of this paper may, by some, be considered somewhat threadbare, but the fact is that it has never had the same importance nor has it demanded as much consideration as it now does since the formation of the Griffith Ministry. Federation is now accomplished, and, in consequence, we of North Queensland will in a large measure be legislated for by the majorities of the two Federal Houses of Parliament representing the Southern States, with but little practical knowledge of our business, climate, or requirements or of the special difficulties we have to contend with. Therefore, it is our business to instruct them and to argue our case in the defence of the employment of such labour as we absolutely cannot do without. Even the most upright judge would be certain to err frequently in his verdicts if only the evidence for the prosecution were heard, and that, if we do not be careful, is apt to be our position. Moreover, Queensland is for the first time represented by a majority of Labour members, and that, too, at its first Federal Parliament.

No doubt there are many sensible men among the Labour members, but I am afraid that there are also many who consider Labour only as opposed to Capital, quite forgetful that, without capital, the country would be of as little use to Labour as it was to the aborigines previous to the advent of the European, and having no conception of a happy blending of the two; for, without Labour, Capital would be equally useless. There are also many who loudly proclaim their political creed as "a White Australia" simply because it sounds well from the mouths of stump orators, and seldom fails to secure applause from the crowds which surround the hustings.

A White Australia might be a very good thing, but they had better stop to consider whether it may not cost too much. To ruin the chief agricultural industry of the North by rough or violent measures which it cannot bear, and depopulate the country, would be a very serious matter, and would not be felt alone by those who are immediately engaged in that industry.

In the North, sugar is the principal crop, and those who devote their attention to it produce little else. Hence, immense quantities of produce and goods of all kinds, machinery, and implements, horses to till the fields, and cattle to feed the labourers, fodder for the horses, and many other commodities are continually being purchased —and mostly from the Southern markets. A large fleet of vessels is constantly employed carrying produce, goods, and passengers up and down the coast.

Take into consideration the value of the sugar produced in the State (about 170,000 tons), when refined and placed upon the market (whether the colonial or the home market is immaterial), and remember that that amount has been distributed in trade.

The farmer is paid for his cane and spends the money in wages, implements, horse feed, and so forth, and in the maintenance of himself and his family. The wages paid are spent by the employee who receives them in a similar manner—in food, clothes, tobacco, &c. *Trade.*—The implement vendor and the farmer who produced the horse feed are in the same category as is also every man who is in any manner, directly or indirectly, employed by the trade, even to the capitalist who provided the capital till the sugar is refined and sold. All make a livelihood by it or a portion of a livelihood, according as they are more or less employed in that or in any other business which is benefited by the trade. To trace the money through all the ramifications of trade were idle and would prove a Herculean task, but a little consideration will show that the money rolls on from hand to hand till the whole is disposed of in the necessaries or luxuries of life, less anything withdrawn by any of the many hands for increase of capital; and the more of that there is the better, as its use gives further employment for labour and increases the market value of that labour.

The greater portion of the money being eventually spent in the necessaries of life must have drifted to the Southern markets, for the North produces no breadstuffs, and most of our clothing and other goods come from the South. I know of no store here where Neighbour's boots are not sold, and years ago, before the heavy import duty was placed on boots, the same thing could have been said of Hunter's of New South Wales. The South, therefore, is just as much interested in the prosperity of the sugar industry as is the North, but, not being so directly interested, the fact is not so evident.

Destroy the principal industry of the North, and not only is a valuable customer lost to the South, but a strong competitor enters the lists against it; for we of the North are here, and although, no doubt, many would be ruined and drift southward to swell the ranks of the unemployed, some would remain and return to the cultivation of maize and such produce as the North will produce; and as wages would naturally be ess, we would probably find it to our interest, for instance, to manufacture our own boots and a few other items rather than send the cash South.

Cane sugar is a tropical or sub-tropical product, the principal source of supply for many years having been the West Indies, and the Clyde the principal seat of the refineries. It is needless to say that, in those days, sugar was a money-making business, and the capital acquired in the trade no doubt materially assisted in giving the West of Scotland an impetus towards the position which it to-day occupies. Now, however, I may say, cane sugar is produced in all tropical countries. The field cultivation requires to be more thorough than that of most field crops, and the soil requires constant stirring till the crop covers the ground—say for six months. Thus there is a great deal of horse work required—suitable work for the white man. The mills and refineries also require a considerable staff of white labour—tradesmen and intelligent labourers. There is also a good deal of labour hoeing the cane rows where horse implements cannot reach, which certainly does not require much intelligence; but the great difficulty of all—that which requires a heavy staff of low-class labour—is the trashing, cutting, and loading. This, in all tropical countries, is and has always been done by low-class labour, and nearly always coloured, as the lowest and cheapest available—in fact, so nearly always, that the exception, as being such, is, as usual, the

proof of the rule. So, before a white man undertakes to make his livelihood by such labour, it were well for him to stop and consider that in doing so he is entering into competition with the lowest-class labour in the world—of such a nature that mechanical aids cannot be brought to his assistance, and superior intelligence is of no avail. Happily, but few white men fall so low in their social status as labourers as to covet such work for themselves, but nothing is too low for the political blatherskite to claim. If, in one portion of the colony, where there are light crops grown, or where there is a dry climate—which, by the way, is most unsuitable for sugar production—trashing has been dispensed with, it is immediately argued that it may be so in all cases. If in any part where there is a superabundance of low-class white labour it has been employed in any of those operations, it is therefore argued that it may be so anywhere else without consideration whether it be hot or cold, wet or dry, healthy or unhealthy, or indeed of any of the manifold variations of circumstances, or whether such low-class labour be available or not, or whether it may be profitably employed at such work. But the fact is that those men omit to state one-half of their creed. It is not only a "white Australia," but "Australia for such of the whites as are already here, and are prepared to join their labour organisations, and to be ruled by their committees," for they want no more even of the white men. They are opposed to all immigration, and, professing to be knights of labour, view labour only as opposed to capital, and are quite regardless as to what industries they wreck so that their present object be temporarily gained—the rise of wages. They would, without one moment's consideration, kill the goose for the golden egg, and think they had done a good thing, too.

Trashing cane cannot be done without, wherever there are heavy crops and a moist climate. Heavy crops of untrashed cane are just one intricate tangle of cane and dead leaves. The cane having grown upward till borne down to the ground by its own weight, grown up again, and again fallen in all directions till it is difficult to tell where the roots are.

In such a condition the sun and air cannot penetrate the mass to ripen the cane. The latter will start into growth at every joint where it comes into contact with the soil, or where moisture is retained at the joints by the dead leaves or thrash. When such cane is wrought, it is apt to produce more molasses than sugar.

Properly cultivated, that cane would be trashed before it fell down. The sun and air would then get through it and ripen it, and the trash stripped from the cane would form a mat upon the ground protecting the cane joints from coming into contact with the soil, the operation being repeated as the cane makes further growth. Light crops of upright growth might take but little injury from not being trashed; but as all dead leaves have to be stripped from the cane before leaving the field (for sugar is not made from cane leaves), where is the economy in leaving that work till harvest—stacking up work till the season when there is most to do? Just what cane trashing is, is not very easily described. The best way to know is to make a fair trial of it in a good heavy crop and in nice, dry, hot weather; not for a few minutes, like the clergyman's trial of the treadmill, but for a day or two from morn till night—an experience which most sugar-growers have had at some period of their lives. In the morning, burrowing through the cane, you will be soaked from head to heels with dew; later, when the day gets hot, you will be soaked in perspiration and choked with dust and dirt and the fine hairs off the cane, your clothes felted with those hairs and your skin irritated by them, as it may have been when a boy by the somewhat similar hairs on the seeds of the wild rose (the Hip of Scotland), and even though there should be a good breeze outside, you will pant for air, for no breeze can reach you there.

There is no comparison possible between harvesting cereal crops in a temperate climate and cane in the tropics. There are as many tons of cane as there are hundredweights of wheat or oats. Cane cannot be bundled up as grain is and handled with a fork, but must be lifted in armfuls and carried on the shoulder and that climbed with on to the top of the trucks. The temperature must not be forgotten. Grain stands in the field till it is convenient to draw it in, but cane must go straight off to the mill or it sours and spoils.

A cane farmer deprived of his labour and placed at the mercy of an unreasonable labour union would be absolutely ruined.

Some years ago the Griffith Ministry decreed that kanaka labour should cease. The result was that many of the sugar-planters abandoned their occupation, and that all property was greatly reduced in value, while those who remained sought low-class labour of other kinds—Chinese, Malays, and so forth, all very objectionable compared to the South Sea Islander, who does not lawfully come into competition with the European. If some people employ kanakas at unlawful work it is not a proof that the law is bad, but that it is badly administered.

In the early days of the Island trade, there were certainly many abuses both in recruiting and in the consequent treatment of the "boys," but that is all changed now, and the trade is under strict Government supervision.

As regards the boys themselves, nothing can be said against their employment from a humanitarian view of the subject. When brought to the colony they are mere savages; and when properly treated and industriously employed for their three years' engagement, they are certainly better men at its expiration than they were when brought here. They are well cared for; their ration is fixed by law, and is greater than that allowed to a white man; they are sufficiently clothed, although previously they wore little or no clothing; they have the same medical attendance as a white man.

The removal of inter-State, and the establishment of federal tariffs, will cause enough confusion for some time to come without interfering with our necessary labour.

Already the leading sugar manufacturers are resting on their oars, for what man in his senses would invest money in an industry that is in danger of being so interfered with that it can only be prosecuted at a loss?

The production of cane sugar has been handicapped for many years by the action of continental nations, who are satisfied to tax themselves heavily to support their beet-sugar trade by a bounty, to the destruction of the British-colonial cane sugar trade, showing that those nations place a very high value on what many Australians seem quite prepared to throw away.

To harass the Queensland sugar industry at the present time is simply to play into the hands of the continental Governments. Let them succeed in their object—establishment of their own trade and destruction of the British—and then the sugar consumers must pay the piper. But hold our own, guided and protected by fair and wise legislation till the artificial stimulus of the bounty is removed, as it must be in time, and the beet-sugar trade will go down as everything else does which has been unduly forced—when it is left to itself. Meanwhile, however, those nations are reaping one benefit which they much value—viz., the establishment of fleets of steamers and general extension of commerce.

The tendency of all unnecessary interferences with trade, whether by legislation or by action of labour unions, is bad. Several trades in Great Britain have been already ruined and driven to other countries by such interference.

Even what is generally considered wise legislation frequently has a very different effect from that intended—instance: To raise revenue at the expense of the Chinese, whom all agree in considering undesirable colonists, a heavy import duty was placed on rice. The result is that the Chinese have, by growing rice, converted the tax into a protective tariff, and the tables are turned.

The white Australian may, in his extreme colour sensitiveness, drive the South Sea Islander from the colony, but surely he will not attempt to follow him and drive him from the Islands—some of them under French, German, and American protection. The sugar trade is already established in some of them. There is abundance of rich soil, and the requisite climate. Sugar-planters are, from their experience, satisfied that they cannot profitably work without abundance of low-class, and, above all things, reliable labour. As it was when previously attempted, so it will be again if the labour be withheld—the industry will be driven elsewhere and the colony be the loser. Our distress will be the opportunity of the continental nations, and of Honolulu, Fiji, and other places.

Orchard Notes for July.

By ALBERT H. BENSON.

The remarks that have appeared in the Orchard Notes for the last three months anent the handling, packing, and marketing of citrus fruits apply equally to the present month.

The pruning of all kinds of deciduous fruit trees should be completed during the month. All prunings should be gathered and burnt, and the tree should then receive a thorough spraying with the lime, sulphur, and salt wash, which is the best all round winter spray, acting both as an insecticide and a fungicide. After pruning and spraying, the orchard should be well ploughed, so as to bury all weeds and trash that may have accumulated, to sweeten the soil, and to break up any pan that may have been formed by summer cultivation.

Citrus trees, from which the fruit has been gathered, should be pruned now, the pruning to consist of cutting out all dead branches or branches having borers in them, as well as all branches, thorns, or twigs growing in the centre of the tree which are not required. The centre of the tree must be kept well opened up, as, unless this is done, the superfluous wood only forms a harbour for all kinds of insect and fungus pests, and, in addition to this, where the tree is not well pruned out in the centre, it is impossible to do good work with the spray pump.

As already stated, all the prunings from the trees should be gathered and burnt, as this is the surest way of destroying any scale insects, borers, or fungus pests with which they may be infested. If you have no spray pump, then the above mixture should be applied with a brush. It will destroy all scale insects with which it comes in contact, and will remove all moss and lichen as well as stop the spread of canker or bark rot.

The planting of deciduous trees can be continued throughout the month, but it is not advisable to delay it more than can be helped, as when the trees are planted, even though they make no leaf or wood growth, they begin to throw out adventitious rootlets which are ready to start work as soon as the first top growth takes place. Don't plant too deep; the depth at which the young trees stood in the nursery is the right depth; trim the roots carefully so as to remove all bruised portions; spread the roots out well, so that they may get a good hold of the ground, and always spread a little fine top soil round them, as this will be conducive to the rapid formation of new roots.

Cut back hard at planting, and don't be afraid that you will spoil your tree by doing so. Failure to cut hard back prevents the formation of a strong, well-grown, symmetrical tree, and always tends to injure the future vigour and growth of the tree.

See that all trees that are planted, whether deciduous or evergreen, are free from pests, as it is much easier to keep disease out of the orchard by planting clean trees than it is to stamp out disease once it has got a fair hold. Where the trees are infested with scale insects of any kind, they should be

treated by hydrocyanic acid gas, as recommended and described from time to time in this *Journal*. If this treatment of the young trees is carefully carried out, there is every chance of their remaining clean for a considerable time after they are planted.

Do not plant rubbish; only plant those trees that your soil and climate are adapted for. Do not try to grow fruits that will only end in failure, as no grower who is dependent on fruit culture for his living can afford to grow fruits that can be produced both better and cheaper by others under more suitable conditions; but he must confine his energies to the culture of those fruits that prove a commercial success.

It costs just as much to prepare the land for and to plant, prune, spray, manure, cyanide, and generally look after an inferior variety of fruit tree, or a variety of fruit tree that is unsuitable to the climate, and from which no return of any value can ever be obtained, as it does to grow a variety that is suitable to the soil and climate, that will produce superior fruit, and for which there is always a ready sale. Therefore, I again repeat that no grower who is dependent on fruit culture for his living can afford to spend time or money in the growing and looking after unsuitable varieties of fruit trees.

Farm and Garden Notes for August.

Farm.—Now will active work in the field be repaid by future rich harvests, provided always that seasonable weather is experienced. Early crops of maize and potatoes may be planted with pumpkins amongst the maize. Plant only such potatoes as have sprouted. In selecting maize seed, choose large, flat, well-matured grain. It has been abundantly proved in America and elsewhere that, by constant selection and change of seed, very large crops are easily raised, as many as five or six cobs being produced on each stalk all over the field. Swede turnips, clover, and lucerne may now be sown, but they will have to contend with weeds which will now begin to rear their unwelcome heads. Therefore, see that the ground, before sowing, has been thoroughly cleaned, and thereafter keep the hoe and cultivator going amongst the crops at all available times. Tobacco may be sown. Plant arrowroot, ginger, and sugar. Rice and coffee should all have been gathered in by this time, but the picking of Liberian coffee only now commences. Where potatoes have been planted early, hill them up, but not to a sharp ridge, or the rain will be thrown off instead of finding its way to the roots. Plant sisal hemp and fourcroya.

Kitchen Garden.—In the kitchen garden, as well as in the field, August will be a busy month. Destroy all plants affected by aphis, and sow carrots, parsnips, beets, lettuce, French beans, runner beans of all kinds, peas, parsley, tomatoes, squash, cucumber, melon, sweet corn, egg plant, &c. Try sound old water-melon seed, and read the article in next issue on the subject. If cucumber, tomatoes, &c., have been successfully raised during the month, plant them out towards the latter end, protecting the young plants from the sun with twigs or some light shading material. Thin out carrots, parsnips, turnips, beets, &c., and set out any cabbage plants which may be ready. Support peas, if necessary, by sticks or wire-netting. Plant Jerusalem and Globe artichokes. Plough up all exhausted cabbage and cauliflower beds, and leave the soil in the rough to sweeten for a month or two before putting in another crop. Pinch off the tops of broad beans as they come into flower to make the beans set. Keep the hoe going, and water when necessary.

Flower Garden.—Ferneries will require overhauling, top dressing with a mixture of sandy loam and leaf-mould, staking up some plants and thinning out others. Look after the roses, which all should have been pruned by this time, rubbing off any shoots which have a tendency to grow in and crowd the centre of the bush, or where a fine young shoot is beginning to grow ahead cut off the branch which it is replacing. This kind of pruning may be adopted with all classes of plants. When the warmer weather arrives in September, begin to plant out tropical plants. All such work as trimming and repairing lawns, the digging of beds, pruning, and planting should be completed. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolor, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins, &c ; plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Dahlias, however, should be put away in some warm, moist spot, where they will start gently and be ready for planting out a month or two later.

SHOWS DURING THE MONTH OF JULY.

Bowen—Proserpine Farmers and Settlers' Association—12th July.

Dalby—Northern Downs Pastoral and Agricultural Association—31st July and 1st August.

Mackay—Pioneer River Farmers' Association—4th, 5th, and 6th July.

Maryborough—Wide Bay and Burnett Pastoral and Agricultural Society—10th, 11th, and 12th July.

By Authority: Edmund Gregory, Government Printer, William street, Brisbane.

THE HON. ARTHUR RUTLEDGE, K.C.

Attorney-General of Queensland; M.L.A. for Maranoa. Born in 1843 in New South Wales. Educated for the Bar in N.S.W.; called to the Queensland Bar in 1878. Mr. Rutledge represented Enoggera Electorate in 1878, and on the dissolution of Parliament in 1883 he was returned for the Kennedy Electorate; on the formation of a new Ministry by Mr. (now Sir) S. W. Griffith was appointed Attorney-General. He afterward represented Charters Towers for about ten years, from which position he retired in 1893, and in 1896 was appointed Crown Prosecutor for the Southern District of the Supreme Court. In February, 1899, he resigned that position and successfully contested the Maranoa Electorate. He was then appointed Attorney-General by the Dickson Ministry, which position he continues to hold. He was appointed Queen's (now King's) Counsel in 1899.

Agriculture.

FARMERS' WOOL.

Farmers who shear a few hundred sheep annually will doubtless appreciate the following points, which the wool-buyers expect to be observed:—

1. The sheep should not be allowed to run too long after washing before being clipped, as this means in effect getting the wool back into greasy condition.
2. Nor should they be clipped while wet, as this takes away the liveliness from the fibre and causes the wool to rot.
3. They should not be clipped in dirty places, such as barns littered with chaff and straw, and other matters, which get into the staple and cause endless trouble and annoyance. The cost of this fault to the user is serious, as it is often impossible to get this foreign matter out without the use of chemicals.
4. When the fleece is wound, no clags of earth nor dung should be left on the fleece, nor put in whilst winding.
5. No locks, tailings, skin-wool, black, nor cots should be wrapped up inside washed fleeces.
6. The fleeces should be tied up with bands made by twisting a portion of the fleece itself. Strings composed of vegetable matter such as hemp, jute, &c., are bad and ought not to be used.

The most careful manipulation by the manufacturer often fails to detect small pieces which do not make their appearance until the cloth is dyed, because the dyes which are required for wool will not do for vegetable matter. Pieces of cloth are often damaged in this way to very aggravating extent.

SPRAYING VEGETABLES WITH PARIS GREEN.

It is generally considered a dangerous practice to spray vegetables, such as cabbages and cauliflowers, with any poisonous material, but experiments made in the United States at the Colorado Experiment Station appear to point to the absolute harmlessness of such spraying for the purpose of killing worms in cabbages. Where the green is dusted from a bag in the proportion of 1 oz. to 100 oz. of flour and just enough applied to make a slight show on the leaves—say 1 oz. of the mixture to twenty-eight heads of cabbage—the worms will all be killed in the course of two or three days, while the average amount of poison on each cabbage will be about one-seventh of a grain. Fully one-half of the powder will fall on the outside leaves and on the ground, and thus an individual would have to eat about twenty-eight cabbages in order to consume a poisonous dose of arsenic, even if the balance of the poison remained after cooking.

DISC-HARROWING OF LUCERNE.

Mr. H. M. Cottrell, manager of the Experiment Station, Manhattan, Kansas, says that disking is of as much value to lucerne (alfalfa, the Americans call it), as cultivation is to corn, and he gives an account of his experience with a poor stand of lucerne which was sown in the dry year of 1894. In 1897 this alfalfa was heavily pastured by hogs. The hogs were taken off early in the fall, and a heavy growth of crab grass came up. The crab grass was so thick and the stand of alfalfa so thin that it was not worth keeping. Late in March, 1898, this field was harrowed with a disc-harrow, the discs sharp and set at as great an angle as possible. It was immediately cross disked with the discs set the same way. The ground was thoroughly pulverised, and the alfalfa apparently destroyed. It soon started, branched out thickly, and we made three good cuttings from that field that summer.

In 1900 we went a step further in disking alfalfa. The season was very dry at Manhattan, the rainfall in June being 1·19 inches, in July 4·51 inches, and in August 2·84 inches. Two fields of alfalfa two years old were disked. One field was disked 28th March, the first cutting for hay made 31st May; disked 6th June, the second cutting for hay made 25th June; disked 27th June, the third cutting of alfalfa made 13th August, and the alfalfa disked for the fourth time 20th August. The last cutting of alfalfa was made 13th September. This shows four diskings and four cuttings of alfalfa on upland in a dry year. Another field of alfalfa was disked and cross-disked 27th March. The first cutting of alfalfa was made 4th June, and the second disking 6th June. Through July and the early part of August the alfalfa was cut from day to day and fed green to dairy cows to help out dried-up pastures. On 20th August the field was disked, and 3rd October the last cutting of alfalfa made. The alfalfa in both fields made fine late fall growth and went into the winter in good condition.

The stand of alfalfa on both fields disked in 1900 was good. A harrow with sharp 16-inch discs was used, the discs being set at a slight angle, just sufficient to turn the soil over, and the harrow was weighted to make the discs split the alfalfa crowns to a depth of 2 inches. The disking split the alfalfa roots, and this made them throw out many new shoots. The disking made an earth mulch over the field and prevented the evaporation of water, so rapid in a dry time from an alfalfa field just after being cut. The discs were set so that they barely turned the soil over, and, running at a depth of 2 inches, they turned the roots of the crab grass and weeds up to the sun, which killed them. These disked fields were clean and free from crab grass in the fall.

We have not disked one-year-old alfalfa. From these experiments we feel safe in recommending disking all alfalfa of two years' or more standing. Make the first disking early in the spring and then disc immediately after each cutting. If the stand of alfalfa is fair to good, set the discs as we did in the experiments made in 1900. If the stand is poor and the growth of crab grass thick, set the discs to cut deeply. Disking is of as much value to alfalfa as cultivation is to corn.

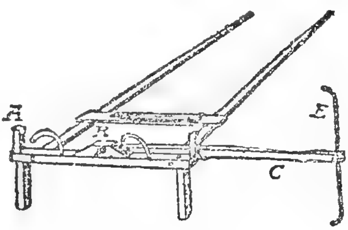
WHEN LUCERNE IS MOST PROFITABLE TO CUT.

Even in times of plenty it is as well to harvest fodder crops when they are most profitable. One of the crops that suffers considerably by age is lucerne. Various experiments have been conducted for the purpose of ascertaining the food value of the plant, also its digestibility, with sheep, while the crop was in its various stages of growth; and according to the conclusions of the Ontario Department of Agriculture, lucerne should be cut when about one-third in blossom, as there is a marked diminution in total quantity as well as digestible food in the two following weeks. In the experiments at Ontario the first plot was cut when the buds were well formed; the second nearly two weeks later, when the blossoms were one-third out; and the last nearly another two weeks later, when the plant had passed the full bloom stage. After cutting, the crop was weighed, cured in the usual way, weighed again, and a sample taken for analysis, the rest being used in the experimental digestion work. With one exception, the largest yield, whether in the green state, as hay, or as dry matter, was obtained from the second cutting, made when the plants were about one-third in blossom. It is possible that the weight of the crop would have increased for a few days longer, but it is clear that by the time of the third cutting there had been a marked decrease, which can be at least partially accounted for by the large number of leaves which had fallen off previous to the third cutting. Chemical analysis showed that the percentages of the most valuable food constituents also decreased by the third cutting. As the plants matured, the percentage of crude protein decreased and the crude fibre increased, pointing to the advantage of earlier cutting; at the same time, however, the absolute weight was increasing up to the time of the second cutting, and owing

to this the greatest absolute quantity of protein was found to be yielded by the second cutting. The relative decrease in protein, and increase in fibre, as the plants mature, is confirmed by some American experiments. As regards the percentage of carbo-hydrates, the experiments under notice showed that this, on the average, increased up to the time of the second cutting; but similar experiments quoted as having been made in the United States did not bear this out. Inasmuch, however, as the absolute amount, as well as the percentage, of crude fibre increased with each successive cutting, the digestibility required further investigation. An experiment was accordingly made with three sheep, fed successively on the three different cuttings of each crop. The dung of the animals, representing the undigested portion of the food, was weighed and analysed, and the results compared with the weight of fodder supplied. It appeared that a gradual decrease in the digestibility, as measured by the percentage of food digested, was recorded as the growth of the lucerne advanced; the deterioration being considerably more rapid between the second and third periods than between the first and second. But here again, owing to the greater weight of hay obtained from the second cutting, the results showed that the largest amount of digestible matter was obtained from the second cutting. The Ontario Department found that both sheep and cattle suffered from indigestion after being fed on lucerne hay made when the crops had reached a woody stage. No doubt many of our Australian sheep-breeders who had to have recourse to lucerne hay during the drought noticed symptoms akin to indigestion with some of their stock.—*Dalgety's Review.*

A GOOD CORN-MARKER.

Among the various types of corn-markers we have from time to time described, the marker here illustrated is, in our mind, the best. The description and illustration are from the *American Agriculturist*, and may easily be understood by an examination of the diagram. It will mark two rows at once, and the rows will be distinct on the roughest ground. To the main body is



attached a guide (C), which is so arranged that it can, on turning, be reversed by lifting and throwing it over the machine to the opposite side. This arm is bolted to a block (R), and being in front of (A) is held in position; (C) is a round iron, and springs readily if it comes in contact with a rough clod or with a stump.

FIRST STEPS IN AGRICULTURE.

FIRST STAGE.

6th Lesson.

By A.J.B.

But all crops are not grown from seed. Some are produced by planting cuttings, either of roots or of the green plants themselves. Others grow from bulbs, or from the bulbs cut in pieces. Take the so-called sweet potato as an example of planting cuttings of the plants. You may grow sweet potatoes from the bulbs themselves, but wherever they are grown in this State the growers prefer to plant cuttings. The cuttings throw out roots, and then long green vines begin to run over the ground from them. These vines are very good for feeding cattle and horses, so you see how valuable the sweet

potato is as a farm crop. The farmer not only gets a crop of potatoes underground, but he also gets a large crop of vines from the surface. The ends of the vines and the leaves are also a very good table vegetable when boiled, and they are often used instead of cabbage or spinach when vegetables are scarce. When you get to know more about the nature of plants you will discover that the sweet potato is not a potato at all, because it belongs to a totally different order of plants. Now, let us see how a crop of *real* potatoes is produced. You probably have seen farmers planting potatoes, and know that they get two crops of them in a year. If you examine the potatoes he is planting, you will see that at one time of the year he plants small potatoes whole, and at another time he cuts large potatoes in pieces. Now, look at these two potatoes. What difference do you see in them? You see little white shoots on one and none on the other. Right. Now, those little shoots, when the potato is put underground, will not be long before they appear above ground with dark-green leaves, and from them long rootlets spring out and spread in all directions, sucking up plant food, as I explained to you in the *First Lesson*. On the other potato you said you saw no shoots. There are only the little hollows from which the shoots will spring by and by. These little hollows are called the "eyes" of the potato. Look at it again. How many eyes can you count? Nine, are there not? And in what part of the potato are there the greatest number of eyes? You see they are most numerous at one end, whilst at the other end there are none at all. If we were to plant this large potato with its nine shoots, they would probably all come above the ground together, and we should have a plant with nine stems. The farmer does not want so many, because he knows that a plant with one or two stems will give him as good a yield as the bushy one, or perhaps a much better yield; so he cuts the large potato into pieces called "setts," taking care to leave two eyes on each sett. We will cut this potato into setts. You see, I have got six setts each, with one or two eyes, with the shoots or "leaf-buds," as we ought to call them, springing from them. Each of the setts will produce a strong, healthy plant if they are planted in good, fertile soil and receive sufficient water and are kept clear of weeds. These six setts will produce more than six times as much as if the potato were planted whole. The young plants are kept moist by the piece planted until it is exhausted, and the roots are able to gather food from the soil. The potatoes are called "tubers" from a Latin word meaning "a swelling." They are not the root of the plant, as some people suppose, but are produced at the ends of some rootless underground branches. If you pull up a potato plant with young tubers on it, you can plainly see that the true roots are quite distinct from the tubers. The potatoes used for planting are called "seed potatoes," but in reality they are not the seed at all. The seed of the potato is contained in the small round green fruit which often appears on the "haulms," as the stalks are called, after these have flowered. But as potatoes are always used to produce other potatoes, they have obtained the name of seed. How to cultivate potatoes will form the subject of a future lesson. Both the common or Irish potato and the sweet potato were brought to Europe from America over 400 years ago by British and Spanish sailors.

The tuber of the sweet potato, unlike that of the Irish potato, is the swelled root of the plant, which is a climbing plant of the same nature as the convolvulus, and bears very pretty white or rosy flowers which resemble those of the convolvulus.

You have now been shown three different ways of producing a crop. First by *seeds*, secondly by *cuttings*, and thirdly by *tubers*. There are other means of producing plants, but they do not belong to ordinary farm work, so I shall say nothing about those methods now. In a former lesson I told you, in our talk about soils, that some soils are very flat and wet, and that methods have to be adopted to get rid of the too abundant moisture. Some lands are so situated that although there is a stiff subsoil, the rainwater runs off in time into rivers, creeks, and gullies; but even then the farmer has to do a great deal to assist nature. So he performs a work called *draining*, and thus, to rid land

of the superfluous moisture, is what is known as draining it. It is one of the most important operations in the process of improving the soil and rendering it fit to receive seeds and to yield a crop. Drainage is a very scientific business, as you will find out by-and-bye. But you can well understand the simple explanation I shall here give you of how draining is done, and of the benefits the soil derives from the work.

To get rid of the water it must be collected into some channel first by which it may be led away into a creek, lagoon, or swamp lying lower than the field we wish to drain. But one channel would not collect all the water from a hundred-acre paddock, consequently there must be more than one. How many, will depend upon the nature of the soil? Let us see what soils most require draining? First, there are low places and swamps on some farms. Then there are others full of great " melon " holes such as you often see on rick black soil. In such places you will notice that pools of water are formed after rain, and the water lies there so long that you begin to wonder when it is going to sink out of sight. But when you have discovered that beneath the rich black soil there lies a stiff yellow clay, you at once see that the only way in which the water can escape is by the help of the hot sun and of strong dry winds. The drying up of the water by these means is called evaporation, from the Latin word "vapor"—steam. You have no doubt held a wet handkerchief to the fire to dry it. What happened? You could see little clouds of steam rising from the handkerchief. The water was being evaporated, and when no more steam rose, then the handkerchief was dry, because all the water in it had been turned into steam (which is lighter than air) and had flown away to join other masses of evaporated water. By and by, when great quantities of this steam are collected in the air, they become visible and form what you call clouds, and by and by all the water falls to the earth again in the shape of rain. There is no new rain anywhere in the world. The water evaporated to-day from the soil of your farm travels away to somebody else's farm, perhaps hundreds of miles away, where it again falls to the earth. Now, we have once more got away from the subject of drains, but you have at least learned whence the water comes which you want to remove from the land.

Besides the swampy lands there are sandy soils, through which the water sinks out of sight, but if you dig through some of these soils, you will find that the water is only hiding—it has not left the land. Why? Because at a depth of 1, 2, or 3 feet, it found our old enemy, the yellow clay, through which it could not pass. So there it remained, getting stagnant, and rendering the soil cold and wet, and only waiting for the roots of the plants to reach it in order to sicken them and at last kill them. So you see that a sandy soil with a clay subsoil is one that must be drained.

Then there are soils consisting largely of clay. Through such soils the rainwater passes very slowly, and when they are clogged with wet it is impossible to plough them; and on the other hand, when dry weather continues for any length of time, the surface is baked into a hard crust by the sun and wind. Then the roots cannot spread or go down into the soil in search of food. The plants consequently sicken and die. But when such land as this is drained, it becomes very valuable, as most crops will thrive in it, once the water is enabled to get away, and when it has been deeply ploughed, manured, and rendered soft and loose.

Sometimes a spring of water is found on some portion of a field. I have seen paddocks in Queensland where there were as many as a dozen springs, all bubbling over, and rendering the whole of the land unfit for cultivation. Where only one such spring occurs, it is easy to carry away the water by leading it into one channel, but when there are many, several channels are required in order to collect the whole of the water and prevent it from spreading over the land.

In our next lesson I will explain to you what drainage does for the soil besides drying it.

Questions on Lesson 6.

1. Are all crops grown from seed?
2. In what other ways are crops produced? Give examples.
3. How are Irish potatoes planted? How sweet potatoes?
4. Why should some potatoes be cut into setts?
5. How does the potato sett help the young plant?
6. What is a tuber?
7. How does the sweet potato tuber differ from that of the Irish potato?
8. What is meant by draining land?
9. What soils require draining?
10. What does the word "evaporation" mean?
11. How does draining improve clayey soils?
12. How may land be drained on which springs are found?

FIRST STAGE.

7th Lesson.

WHAT DRAINAGE DOES FOR THE SOIL.

I told you in a former lesson that by means of drainage, stagnant water is removed from the soil. But the benefit does not stop at drying the soil. Stagnant water is cold, and consequently it *reduces the temperature* of the land. What results from a low temperature? The crops produced on the land come to maturity later than they would on a warm soil. This is a very important matter, because a farmer or gardener who can get his crops to market early in the season, always gets a higher price for them than he does when there is a plentiful supply in the market.

Now, by removing the cold stagnant water the temperature of the soil is raised, and consequently seeds placed in it germinate quicker and the plant also grows quicker and more vigorously. You can easily prove this by a little experiment. Flower pots, as you know, have a hole at the base to allow of the passage of water, either by passing from the surface to the bottom of the soil they contain or by being sucked up from the saucer through the soil towards the surface. By this means a proper supply of moisture is kept up, and air also makes its way through. But take a pot without a hole, or a jam tin. Fill it with soil; plant a seed or two in it. Do the same with the other pot, or make a lot of holes in another jam tin. Place both on saucers, and after sowing some sort of seed in each, water the soil. The seeds in both pots will germinate. As the young plants grow it will be noticed that those in the pot in which no holes have been made grow very slowly, and instead of exhibiting a healthy green, present a sickly yellowish appearance, whilst those in the other pot soon outstrip them and look healthy. Why is this? The water in the first pot is unable to get away. The plants are unable to absorb it all, and it lies stagnant at the bottom of the pot. The soil is thus rendered cold and stiff, and the rootlets cannot force their way through it, and if they do, they find themselves in a cold pool which causes them to sicken and renders them unable to supply the needful food to the plant. In the other pot, the holes in the base enable the superfluous water to get away, and if watering be discontinued, that which is in the saucer will rise by capillary attraction, and so furnish the needful supply to the plants.

The farmer must then get rid of the superfluous water on his land by draining it—that is, making channels by which the water can escape to a lower level and leave the field dry and warm.

I have, in the 6th lesson, told you what soils require draining in order to get rid of water which is not wanted.

The draining of land, however, has another effect upon the soil.

Air can only penetrate the soil to the level of stagnant water, and, as you have learnt, plants require air as much as human beings do, so their roots will

go no lower than the level of the water. But lower the level of this water—that is, make it sink a foot lower—what happens? As the water sinks, the air is sucked down after it through the soil. When this happens, the roots will go deeper, and a larger quantity of plant-food is found by them. The air sweetens the soil which has been made sour by the stagnant water. Another thing you will notice about the soil is this: Drained land is always warmer than undrained land. Just go in the evening for a walk over a hill and descend into a wet flat. On the hillside you find it warm, but when you reach the flat you will find it is much colder, and hence it is that in winter you will often see no frost on a hill, whilst crops of sugar-cane, sweet potatoes, bananas, and pumpkins are killed by the frost on the flat.

You can see how very important it is to a farmer to have warm land. His crops can be got in earlier in spring, they will ripen sooner, and he will get a better market than if he planted them on a cold soil.

It is drainage which makes all the difference. Then there is another good work done by drainage. The rain, as it falls through the air, carries with it many substances floating in the atmosphere which are useful in making the soil fertile. When the land is properly drained, these "fertilisers" are held in the soil for the use of plants, but where the soil is soaked with stagnant water during heavy rains, both the water and the fertilisers are washed away over the surface and lost. There are other good effects produced by drainage which you will learn when you are further advanced.

Some people think that draining some lands will make them too dry. But they are wrong. I told you how drainage drew air into the soil and sweetened it. Now, I will tell you what a sugar planter at Bundaberg did a little time ago. He spent a great deal of money in draining a large sugar-cane field, and after the work was done no rain came and all the other planters laughed, for no water came out of these drains, and they said he had wasted his money.

But as the cane grew it was noticed that during all the dry weather that season, when everybody's cane was drooping and scarcely growing at all, the cane on this drained land kept on growing, and the canes held up their light-green heads above all the other canes, and the crop was nearly double that on the other plantations although there had been no rain, and not a drop of water ran through the drains. Now, you can, of course, say why this crop was so good. You remember the lump of sugar which sucked up the water, although only a small corner of it was put into the saucer. In the same way the moisture from deep down rose through the warm, well-aired, loose soil, and the cane roots went deep down to meet the water, and so they stood the dry weather and grew quickly.

One of the great troubles of a farmer on wet land is, that after heavy rain he has to wait a long time for the surface soil to get hard and dry enough to enable him to work his horses and ploughs. If the land is undrained he will lose many days in the year in this way. But on well-drained land, as soon as the rain stops, the surplus water is carried away by the drains, and after a day or two of warm sun or drying winds he can go to work again.

By and by you will be taught how draining is done, and the various kinds of drains suited to different soils and aspects. Meanwhile you can see what a very important matter this drainage is to the farmer.

How are you to know when draining is necessary? Here are a few simple rules which you should learn by heart:—

1. Whenever, after rain, water remains in the furrows or stump holes.

3. When the soil sticks to your horses' feet or farm implements.

3. Whenever you see water in the hoofprints of horses or cattle.

4. When animals sink deeply into the soil.

5. When the rays of the sun form a hard crust on the soil.

6. If, after rain, a stick is put into the ground and taken out, water will rise in the hole.

7. If crops will grow better when land is gathered up into small ridges.

The benefits derived from drainage you should also keep in mind. Learn the following twelve:—

1. Draining removes stagnant water from the surface and subsoil.
2. It lengthens the season; well-drained land can be worked much sooner after rain.
3. It deepens the soil.
4. It warms the soil by stopping evaporation.
5. It equalises the temperature of the soil.
6. It carries down soluble substances to the roots of the plants.
7. It prevents injury from drought and wet.
8. It improves the quality and quantity of the crops.
9. It increases the effect of the manures.
10. It prevents the heaving of the soil.
11. It helps to prevent disease in plants.
12. It increases the general health of the locality.

Questions on Lesson 7.

1. What does drainage do for the soil?
2. What results from a low temperature of the soil?
3. Describe an experiment to show this?
4. How does drainage affect the fertilisers brought from the atmosphere by the rain?
5. Has drainage any effect in preventing frost?
6. How can you tell when drainage is necessary?

THE COSME COLONY, PARAGUAY.

The Cosme Colony, founded in 1894, by a number of Australian colonists anxious to form a communistic settlement, in which all property except personal effects should be held in common, has, since its establishment, passed through many vicissitudes. Co-operative and communistic societies appear theoretically to answer all the requirements of the human race. Practically the success of such communes has always proved a dream of Utopia. It was not long before dissension arose amongst the members. These dissensions began even on board the ship which carried the enthusiasts from these shores to the blissful colony that was to be. They lost sight of the fact that where any laws—either under a monarchy, a republic, or in a socialistic commune—are made for the benefit and protection of the people, there must be someone to administer those laws; and further, the administrator, that he may not develop into a despot, must be guided and restrained by others chosen by the people for the purpose. Call this administrator and these chosen ones a governor and a parliament, a king and his ministers, or an elder and his co-elders, the result is the same. They are the rulers of the people *pro tem.*, and they rule by the will of the people, who voluntarily subject themselves to them so long as they rule wisely and carry out the will of the people. Absolute equality—liberty, equality, and fraternity—cannot exist in any community under the sun, hence none can wonder at the failure of the Paraguayan visionaries to establish a thriving commune. Eventually those who did not abandon their Utopia in disgust settled in what is now known as the Cosme Colony. To reach it the traveller has a long river journey to the town of Asuncion, thence a day's journey by rail to the nearest railway station, and, finally, an ox-cart journey of 20 miles to the colony. It is seven years since the colony was founded by Mr. W. Lane, who has since abandoned it himself. Still, it lives on with a population of twenty-eight men, eighteen women, and thirty-seven children. These all live in a village which is laid out to cover in the far-away future (if ever) 66 acres. The total amount of clearing done during the seven years of the colony's existence is 150 acres. Maize and sugar-cane, mandioca, and fruit are grown. The live stock consists of cattle, horses, pigs, poultry, &c. To sum

up, Cosme is a co-operative colony; all property, except personal effects, being held in common. "To each according to his need" is the basic principle of the association. There is a school-house, a social hall, a library, a large machine shop, and a store on the premises. The colonists saw their own timber, grind their own flour, tan hides, make their own shoes, have a wagon and blacksmith's shop, and manufacture a large amount of sugar and molasses (no mention is made of a sugar-mill—Ed. *Q.A.J.*) for sale and for their own consumption. We gather our information from a neatly printed royal octavo monthly publication, *The Cosme Monthly*, which certainly bears the truth of the condition of the colony on the face of it. The editor clearly shows the hardships and difficulties under which the brave little band of enthusiasts struggles along, and makes no attempt to glorify the existence, which those who did the pioneer farming in Queensland know full well must be a very hard one for men and women. Let us hope that the future destiny of the colony Cosme may be like that of the colony of pilgrim fathers, who went through even greater hardships (icy winters and hostile Indians being superadded) after reaching the other America in the "Mayflower."

ONIONS.

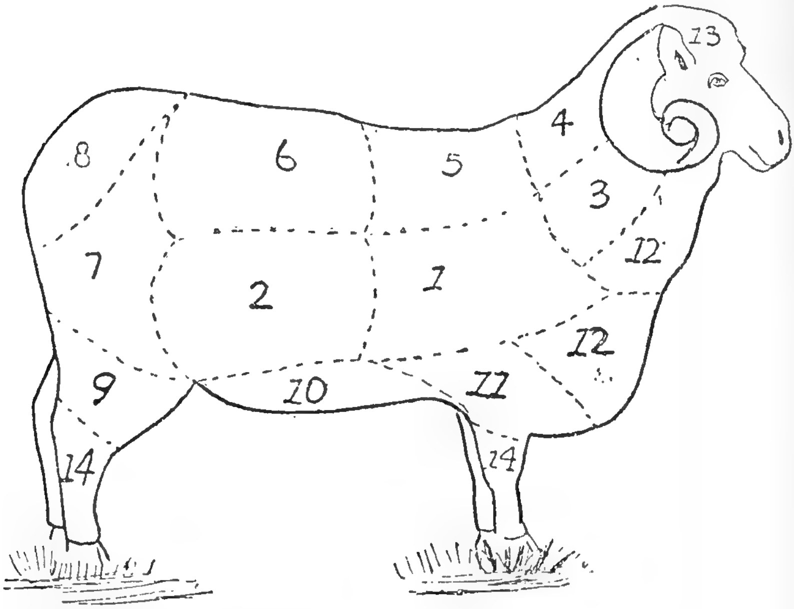
Mr. W. S. Keast, representative for Dandenong in the Victorian State Parliament, who has been a farmer all his life, and is now a partner in the firm of Keast and Co., the well-known produce merchants of Melbourne, paid a visit last month to Brisbane, his object being to ascertain the best methods of disposing of Victorian agricultural and horticultural produce in the coast cities of this State.

As he was passing through the Darling Downs, he was greatly struck with the large extent of rich fertile soil between Warwick and Toowoomba, and stated that it was the grandest agricultural country he had ever seen.

It would be difficult to find any land in Australia more suitable for onion-growing. The demand for onions was constantly increasing, and at a price that must be very remunerative to the growers. The Victorian farmers were abandoning onion-growing in many districts owing to the exhaustion of the soil. One of the plant foods required in quantity for onions is potash, and this, says Mr. Keast, has been practically all taken out of the Victorian soil wherever onions have been grown for any length of time. Certainly this ingredient can be supplied by the use of artificials, but, as this means expense, the farmers are devoting their attention to other crops. The two principal onion-growing districts of Victoria are Port Arlington and Colac, and the farmers of these districts are now going in extensively for dairying.

Onions are worth £13 per ton in Sydney, and much about the same price is obtained in Brisbane. The area under onions in Queensland does not exceed 60 acres, and the last return of the Registrar-General sets down the yield of 51 acres at 148 tons, whilst the State imported 3,559 tons. The average yield in Queensland is about 6 tons per acre, but 8 tons per acre is no uncommon return from suitable soil. A record crop of 29 tons per acre was obtained in San Luis Obispo County (California). How is it, then, that farmers in this State do not go in more largely for their cultivation, seeing that an average crop of 6 tons will be worth £78? As regards soil for onions, the rich black soil of the Downs is not so well adapted to them as the rich sandy loam of the same district. Ideal soil for this crop is to be found in large areas in the scrubs at the back of Laidley, Forest Hill, and Gatton. It is rich, friable, easy to work, will not cake, and does not lie so low as to retain the superabundant moisture after heavy rains. On this land we grew a heavy crop of magnificent bulbs. The seed was sown in April—Brown Spanish variety. Transplanting was done in July, and, the season having proved favourable, the labour was richly rewarded, the yield averaging 6 tons, and sold at £25 per ton.

DESCRIPTION OF WOOL ON VARIOUS PARTS OF A SHEEP.



1 and 2. The finest, longest, and strongest wool.
3 and 12. Short but close.
4. Rather longer and a shade lower than 3.
5 and 6. Slightly coarser, not so close, and apt to become weak in fibre.
8. Lower grade still, and termed the "britch."
7. Good length, but slightly lower in quality than 1 and 2.
9. Shorter and not so lustrous when compared with better parts.
10. Short and generally poor in quality.
11. Shorter than 12.
13. The cap; dry and harsh.
14. Fribby and of little value.

Nos. 9, 10, 11, 13, and 14 constitute the "skirt."—The Western Australian *Journal of Agriculture*.

DISTRICT EXHIBITS AT THE EXHIBITION.

Five districts have this year taken part in the competition of the agricultural districts of the State, and the display made by each gives evidence of the great interest taken by the several societies in the event. The first prize must of necessity fall to one of them, and although the whole resources—agricultural, mining, mechanical, &c.—of each district had evidently been taxed to the uttermost, we were not surprised when the palm was awarded to Toowoomba.

The exhibits here were of such a varied nature that one begins to wonder what cannot be grown, produced, or manufactured in and around the "garden of Queensland."

The four other districts had a tough row to hoe to compete against such a rival, but we were pleased to see that the Eastern Downs exhibit, under the management of the indefatigable veteran secretary, Mr. Selke, ran so close to the winner of the first prize that it might almost be said that, as a whole, both were of equal merit, the Toowoomba district scoring only 8 points higher than Eastern Downs.

The Logan district, marshalled by Mr. F. W. Peek, received 62 points, being 4 less than it gained last year. Yet the exhibit showed a vast range of resources—agricultural, horticultural, and industrial. What future does not lie before a district which can produce on a commercial scale the products of the temperate, sub-tropical, and tropical zones? Strawberries, apples, maize, wheat, rice, sugar-cane, oranges, arrowroot, frozen fish and turtle, besides almost all the vegetables known to the horticultural world, were there in profusion. Could this exhibit have been transported on the flying carpet of the Arabian Night's story, and set down in any of the great centres of agriculture in the old country, we can imagine the astonishment it would create and the eagerness which would be shown to reach such a land of plenty. The exhibit would have been worth a dozen emigration lecturers. The same, of course, could be said of all the rest.

Maroochy showed up well, and should feel that it has fairly held its own with the modest total of 38 points. There is no need for discouragement. The society has only been a year in existence. It has not as yet developed so much of its industrial as of the agricultural and horticultural resources, but in the course of two or three years Maroochy will run the other districts to a close finish. The exhibits were well displayed, and the president of the society, Mr. J. F. Wilson, did good service for the district. Here, again, it was shown what a marvellous range of products of the most opposite nature can be found within the limits of a single district. Ginger, yams, coffee, arrowroot, and tapioca, sugar-cane, pineapples, bananas, and oranges were seen side by side with potatoes, all kinds of vegetables, butter, cheese, &c. The district also produces gold, which was shown in various forms. Although we leave a full description of the exhibits to the local Press, it behoves us to mention a beautifully made quilt and pillow, the work of Mrs. McMullin, which must have taken much time and patience to produce. A remarkable fern was here shown, which is said to grow only in Cairns, yet here it was—grown in the Maroochy district.

The Lockyer was well represented, and its interests attended to by Mr. J. Fielding. As may be supposed by those who know the grand fertility of the Lockyer and Laidley Creek soil, agricultural exhibits preponderated in this section, and certainly would be hard to beat anywhere. In potatoes especially was this noticeable, Mr. T. Fisher's being marvels of size and symmetry. There was also an excellent trophy of hay pressed ready for export by Mr. MacCartney, of Forest Hill. Fruit, citrus and others, was very much in evidence, and showed what the district was capable of producing, whilst enormous pumpkins and a great variety of splendid vegetables gave evidence that the soil responds generously to labour. In manufactures the district is not strong. Still there were shown well-made saddlery, buggies, a German wagon, cabinet-ware, tiles, leather and dressed skin; coal, wool, tiles and building-stone were also exhibited. The wealth of the district in its dairy products was shown in the excellent exhibits of butter and cheese. The famous Helidon Spa water was also not forgotten.

The Queensland Agricultural College was well to the fore with a most varied assortment of exhibits, amongst which dairy products took the foremost place. The College has long since become famous for its butter, cheese, condensed and preserved milk, bacon, hams, and general pig products. These the students have become proficient in setting out in most attractive exhibition style, and the attendant students were quite equal to meeting all the inquiries which were showered on them by visitors to this section. Naturally the exhibits in maize, pumpkins, and vegetables were, in variety, similar to those of the Lockyer district, in which the College is situated, but there were in addition samples of ensilage of excellent quality, hay, chaff, paspalum hay and chaff, broom corn, olive oil, sisal hemp, and a few other items which lent additional interest to the exhibit.

In one of the sections—Warwick—a pot of strawberry plants was placed non-competitive. Mr. A. H. Benson was asked his opinion about this exhibit. He said it was not grown in Warwick. Taking a leaf, he said that there was only one district in Queensland (North Pine) which produced this strawberry. It was then explained that the plant in question had been sent by somebody at the North Pine to a friend in Warwick who had handed it to Mr. Selke to be used as an ornament to the section.

Taking the district and College exhibits as a whole, they most effectually demonstrated the resources of the country, and it is only to be regretted that Bundaberg and Maryborough, the Central and Northern districts, did not enter for what may be characterised as the blue ribbon of Queensland agriculture.

STEWARDS AT SHOWS.

Mr. W. R. Robinson struck the right note when, at the late Agricultural Conference at Bundaberg, he spoke about the value of efficient stewards in charge of exhibits at shows. It too often happens that men accept the position of steward without the remotest idea of the duties it entails. The consequence is that exhibits get into their wrong classes, prize tickets are either not attached to the exhibits they are intended for, and, as we have seen on more than one occasion, many exhibits are at the time of judging found to be without the catalogue numbers. Another evil is, that some stewards appear to think that, as soon as the exhibits are safely stalled or penned and duly numbered, there is nothing more to be done, and they leave their section in charge of the caretaker, who, as a rule, knows nothing whatever about the exhibits, and can supply no information which visitors or intending buyers (in the case of stock or implements) seek for.

More especially are the services of the stewards needed when the judges begin their work. Mistakes have often been made, as we have said, in numbering an exhibit. It is in its wrong class, and although it may be of exceptional merit, yet owing to wrong classification by the stewards it is passed over without notice. This is a great injustice to the exhibitor, who may not be on the spot to see that no mistake is made in classification. It often happens, especially in the case of poultry, that an exhibit arrives in the absence of the stewards. The caretaker receives it amongst a host of others, and by and by discovers a coop with neither name nor address on it. "What shall we do with this?" he asks. Their being no one to supply the answer, he claps it into a spare pen, where it is overlooked and eventually unjudged. The presence of the stewards is also most necessary when the show is over and exhibits are being removed. It is then their duty to see that the rightful owners take them away, and, previously to this, that the prize cards have been correctly attached to the winning exhibits.

Stewards are practically responsible to the management of an exhibition for the safekeeping of the exhibits they have undertaken to take charge of, and it is obviously to their own interest that they should be always in touch with the attendants, and that they should see that no exhibit is removed without a receipt being given for it, and, further, that no exhibit be allowed to pass out without an order singed by one of themselves.

Much of the work of the judges depends upon the care given by the stewards to the disposal of exhibits and to the arrangements made for the convenience of the judges. These arrangements are left entirely in the hands of the stewards, and, if they fail to carry them out in such a way as to facilitate judging and observing, they are neglecting a duty for which they are obviously unfit, and which they should never have undertaken.

THE VALUE OF BARLEY AND PUMPKINS AS HORSE FEED.

Some time ago attention was called to the value of barley as a horse feed, and the advisability of horse-owners availing themselves of the low market values ruling for it to economise on their feed bills.

Another most valuable food for horses, and with us mostly always to be had at low values, is the pumpkin. In many lands much labour is bestowed on growing carrots for horses. In the pumpkin I believe we have a superior food, which grows with little expense or outlay on labour.

I have owned horses on several occasions, so ruined by "old man asthma" from chaff feeding that they could not be longer worked on chaff and corn—sent to me by their owners—and have worked them for years afterwards so long as I could provide them with a pumpkin ration in lieu of corn and chaff. They had wind sufficient to do a fair amount of work, while on corn and chaff they had not wind to pull 50 yards without stopping to get their breath.

Perhaps one reason for the pumpkin not catching on amongst horse proprietors in our cities is the fact that horses heavily fed with maize and chaff do not readily take to pumpkins; but this could no doubt be met by having a cutter or even a pulper, and mixing the pumpkin with the usual ration.—A Farmer.

DRESSING SEED BARLEY WITH BLUESTONE FOUND SUCCESSFUL.

In our issue for June, p. 415, we quoted the experience of an English farmer in the matter of dressing seed barley with bluestone. He maintained that a dressing of 1 lb. of bluestone in 6 gallons of boiling water, as a dressing for 448 lb. of seed, ensures a better start and prevents the appearance of smut.

In confirmation of this, we have just received a letter from Mr. J. R. Martin, Hobart House, Cawdor, near Toowoomba, who says:—

I wish to substantiate the statement of the correspondent of the *London Agricultural Gazette re* dressing seed barley with bluestone. I have made experiments on wheat, oats, barley, and rye dressed and not dressed, and sowed the seed at the same time. The results were as follow: The seed treated with bluestone was free from smut and yielded a fair sample of grain. The other, not dressed, was full of smut and blighted grain, and very much pinched. I have always preferred using a pickle for preparing seed to sprinkling, as by doing so each grain will be affected by the liquid. I always used ¼-lb. of bluestone to one bushel of grain; steep it for two or three hours, and then sow at once. I have never found any ill effect from this treatment. If the seed, after being removed from the pickle, is not required for present use, spread it on a barn floor, and it will dry off and be ready for sowing when required, without any further trouble. I advise any farmer, who wishes to have clean grain or first-class hay, to pickle the seed before sowing, and he will find the benefit of it.

PEAS IN AMERICA.

Most intelligent readers of agricultural literature know that farming, fruit culture, horticulture, &c., are carried on on a vast scale in the United States. In this State the man who harvests a crop of 1,000 acres of wheat and barley is considered a large farmer. In the States such farmers can be found by the thousand. The planting of 5 acres of peas would be a remarkable feat for Queensland; but in America—in the State of Wisconsin—one farmer has 2,400 acres of peas alone, whilst another in Maryland has 600 acres under the same crop in one field. Each row of peas is 2 miles long, and twice a week the cultivators are sent through the whole field. It required 1,800 bushels of seed-peas to sow the ground. Fertilisers were used to the extent of 120 tons,

and during very dry weather the whole crop was irrigated. We have in Queensland immense areas of splendid agricultural land, on the vast plains of Central and Southern Queensland, which require little or no clearing.

The rainfall, it is true, is at times uncertain, but underground water there is in superabundance, which can be tapped with the certainty of large supplies rising above the surface. Some of these artesian waters are certainly not suitable for irrigation purposes, owing to the presence of alkalies, but much that has been brought up is excellent for all purposes. In addition to these advantages, we have a magnificent climate and fair immunity from rust. But whilst we may have the man with the money required to put 10,000 acres under cereals, such a capitalist has not yet been found to lead the way in big farming. The tendency in this State is towards small farms and close settlement, and it only needs to point to the enormous wealth of France to show how that wealth is mainly the result of intense farming of very small areas of land by populous village communities: 500 farmers on 10,000 acres would be of infinitely more value to the State than if the whole area were cultivated by one man. This has clearly been shown in the case of the sugar and coffee industries.

A WATER HYACINTH DESTROYER.

Whilst the dwellers on the Bremer may rejoice that the fresh three months since in the river carried away seaward the most of the water hyacinth which threatened to impede navigation, it should be borne in mind that the pest spreads with great rapidity, and what has happened is sure to happen again—*i.e.*, the blocking of the river at the head of navigation. The *Sugar Planters' Journal* says:—

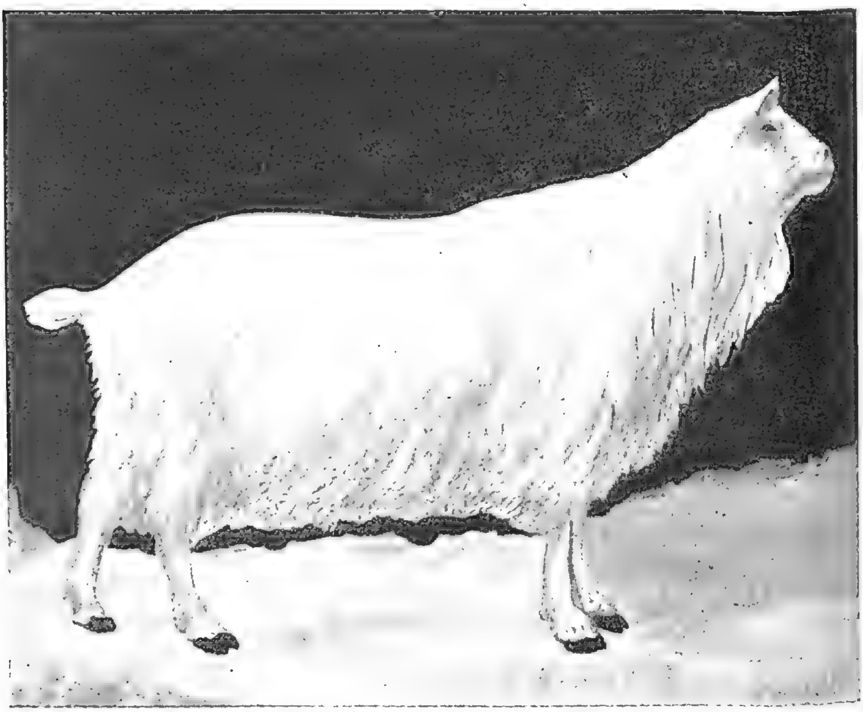
The great pest of our small bayous and coulées, the water hyacinth, has taken such a firm and unyielding stand that drastic measures are now necessary for its eradication. Numerous attempts have been made to get rid of this rapidly-spreading menace to navigation, but apparently in vain. Terrebonne parish in particular has waged a vigorous war against it, a special appropriation having being made to dredge out the many bayous there. The dredges, which are serving the double purpose of deepening the channel of the bayous, as well as cleaning out the hyacinth, move but slowly, and, in consequence, stray bits of plant float in behind the boat and multiply so quickly as to impede navigation, or stop it altogether, before the bayou has been entirely dredged.

Major Quinn, of the United States Engineering Corps, when stationed here, devised an arrangement, recently perfected by the Johnson Iron Works, which bids fair to be put into general operation for clearing our streams of the hyacinth, and destroying it at the same time. The machine proper has been placed on a flat-bottom boat of light draught, it consisting of an arrangement for drawing the hyacinth from the water, which is deposited on a carrier that feeds it into three rollers of the sugar-mill type. Each roller is 18 inches in diameter by 30 inches in length, and moves at a speed of 3·7 revolutions per minute. After passing through the mill the plant is burned, thus insuring against the possibility of it ever reviving, for simple mutilation only multiplies its growth.

As the trial cruise of this boat is now going on, it being reported as working satisfactorily, in all probability the National and State Governments will order many duplicates of the machine, and then the extermination of the water hyacinth may be expected.

Plate I.

STATE FARM EXHIBIT AT THE BIGGENDEN SHOW, 1901.



GERMAN CROSS-BRED GOAT.

Dairying.

REPORT ON WORK QUEENSLAND AGRICULTURAL COLLEGE—APRIL AND MAY, 1901.

Farm.—The following are the principal operations in connection with the farm during the period under review:—A large amount of chaff, mixed and oaten, has been cut and forwarded to Brisbane for sale, the total quantity being upwards of 47 tons, exclusive of that used by ourselves. Twenty-eight acres have been cleared of weeds, ploughed, and cultivated in preparation for planting with wheat, oats, and other crops. The area under lucerne has been increased by 12 acres; we now have 76 acres under this crop. A large quantity of lucerne and panicum hay has been made and carted into the shed. The lucerne crop last planted, 26 acres, has been cut and placed in a silo. The vineyards, on hill and near creek, have been ploughed and thoroughly cultivated. A crop of Hungarian millet ($1\frac{1}{2}$ acres) has been cut, cured, and stored.

The Brisbane Exhibition has entailed a large amount of work, in the preparation and classification of exhibits for the College trophy, cartage to Gatton, and other work.

The aggregate rainfall for the two months was 5·41 inches; for eleven days, 3·86 during April, and 1·55 in May; the principal falls being—0·60, 17th April; 2·61, 22nd April; 0·55, 3rd May; 0·79, 27th May.

The mild, showery weather that we have experienced has been most favourable for the growth of weeds; consequently a large amount of time and labour has been expended in order to keep the crops clean.

Several large parties of farmers and others have visited the College, including 150 from the Fassifern district, 50 from Rosewood, and 60 from Ipswich. All professed themselves well pleased with what they saw.

Dairy.—During the months of April and May the average number of cows milked was 58 head, giving 6,308 gallons of milk. Of this quantity, 1,737 gallons yielded 1,870 lb. of cheese, and 2,341 gallons returned 1,017 lb. of butter, the rest of the milk being fed to calves or used for domestic purposes. The increase during the time was as follows:—Ayrshires, 1 male, 3 females; Guernsey, 1 female; Shorthorns, 2 males, 3 females; Shorthorn-Guernsey, 1 male, 2 females; Crossbred, 1 male. 1 Shorthorn cow died during April.

Piggery.—Increase:—Pure Berks., 12 boars, 14 gilts; Small Yorkshires, 3 boars, 4 gilts; Large York.-Berks., 8 head; Tamworth-Berks., 6 head; Tamworths, 2 boars, 2 gilts; Grades, 7 head.

Sales.—Pure Berkshires, 18 boars, 23 gilts; Mid. Yorks., 3 boars; Small Yorks., 3 boars, 4 gilts; Large Yorks., 3 boars; Tamworths, 1 gilt; Grade Berkshires, 33; Tamworth-Berks., 4; M. York.-Berks., 13; M. York.-L. York., 3; L. Yorks.-Berks., 7.

Five head Grade Berkshires were killed for curing, and 3 porkers for dining-hall.

GOATS IN GERMANY.

In Germany the goat is a source of great comfort and of fair profit to the less wealthy farmers. The animal there preferred is hornless, and the females are often mated with the Frisian, bare-faced, bare-legged, hornless, long-woolled sheep. With good feeding and attention the Frisian sheep yields 2 quarts of milk, generally throws two lambs, and a wether furnishes 80 lb. of good mutton. The wool is of long staple, and much used for stocking knitting. We give here an illustration of a celebrated Frisian goat, "Zampa," taken from the *Hannoverscher Landmann*. This animal was born in 1892, and is entered in the herdbook of the Steinburg Goatbreeders' Association as No. 3, bred by the Goatbreeders' Association of Pfungstadt (Grand Duchy of Hesse), and owned by the Goatbreeders' Association of Steinburg, Itzehoe Schleswig-Holstein.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 30th April, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Rosebud ...	Ayrshire	10 April, 1900	550	3·8	23·40	
Ream ...	,, ...	24 July ,,	470	3·7	19·48	
Isabelle ...	,, ...	7 July ,,	562	3·8	23·92	
Lena ...	,, ...	13 July ,,	510	3·7	21·13	
Leesome ...	,, ...	18 Sept. ,,	750	3·8	31·92	
Ream Ruth	,, ...	20 Sept. ,,	514	3·7	21·3	
Ruth ...	,, ...	8 Oct. ,,	484	3·8	20·6	With first calf
Laura ...	,, ...	28 Aug. ,,	496	3·9	21·67	With first calf
Renown ...	,, ...	29 Nov. ,,	501	3·8	21·32	With first calf
Laverock ...	,, ...	19 Dec. ,,	802	3·7	33·23	
Blink ...	,, ...	20 Feb., 1901	1,021	3·7	42·3	
Annie Laurie	,, ...	25 April ,,	135	3·6	5·4	
Bonny ...	,, ...	12 April ,,	401	4·0	17·9	
Ruby ...	,, ...	9 April ,,	250	3·5	9·8	With first calf
Jersey Belle	Jersey	21 May, 1900	220	5·5	13·55	
Content ...	,, ...	18 July ,,	432	4·5	21·77	
Playful ...	,, ...	14 July ,,	625	4·3	30·1	
Baroness ...	,, ...	3 Aug. ,,	397	5·0	22·23	
Carrie ...	,, ...	18 Aug. ,,	402	5·1	22·96	
Spec ...	,, ...	26 Aug. ,,	299	4·8	16·07	
Stumpy ...	,, ...	29 Aug. ,,	655	4·4	32·28	
Evileen ...	,, ...	2 Sept. ,,	498	5·6	31·23	
Beatrice ...	,, ...	3 Sept. ,,	363	5·5	23·36	
Connie ...	,, ...	8 Sept. ,,	540	4·9	29·63	
Ivy ...	,, ...	28 Aug. ,,	321	4·8	17·26	
Bashful ...	,, ...	2 Nov. ,,	454	5·4	27·46	
Effie ...	,, ...	6 Jan., 1901	778	4·2	36·6	
Fancy ...	South Coast ...	21 May, 1900	302	4·3	14·5	
Damsel ...	Holstein	19 Jan., 1901	966	3·1	33·5	
Dairymaid ...	,, ...	3 Mar. ,,	1,033	3·0	34·7	
Lady Rose ...	Guernsey ...	15 April ,,	223	4·0	10·0	With first calf
Russet ...	Grade Shorthorn	7 Oct., 1900	495	3·8	21·07	
Alice ...	,, ,, ...	13 Nov. ,,	621	4·0	27·82	
Stranger ...	,, ,, ...	7 July ,,	620	3·6	25·0	
Duchess ...	,, ,, ...	24 Aug. ,,	375	3·9	16·38	
Restless ...	,, ,, ...	3 Sept. ,,	640	3·7	26·52	
Rosella ...	,, ,, ...	5 Sept. ,,	655	3·8	27·88	
Lucy ...	,, ,, ...	27 Sept. ,,	720	3·5	28·22	
Leopard ...	,, ,, ...	29 Sept. ,,	477	3·5	18·7	
Redmond ...	,, ,, ...	12 Sept. ,,	601	3·7	24·91	
Laurel ...	,, ,, ...	10 Sept. ,,	617	3·7	25·5	
Empress ...	,, ,, ...	20 Nov. ,,	685	3·6	27·6	
Curly ...	,, ,, ...	10 Dec., 1899	619	3·9	27·0	
Trial ...	,, ,, ...	31 Oct., 1900	815	3·9	35·5	
Rusty ...	,, ,, ...	23 Dec. ,,	789	3·7	32·6	
Ginger ...	,, ,, ...	19 Dec. ,,	727	3·8	30·9	
Polly ...	,, ,, ...	21 Feb., 1901	640	3·6	25·8	
Violet ...	Shorthorn ...	9 Oct., 1900	645	3·7	26·7	
Louisa ...	,, ...	6 April ,,	389	3·7	16·1	
Spot ...	,, ...	11 Sept. ,,	497	3·7	20·6	
Kit ...	,, ...	28 Sept. ,,	570	3·8	24·2	
Plover ...	,, ...	3 July ,,	633	3·8	26·9	
Frizzy ...	,, ...	23 Aug. ,,	564	3·4	21·4	
Roany ...	,, ...	17 Mar., 1901	450	3·7	18·6	
Cherry ...	,, ...	11 April ,,	412	3·8	17·5	
Rose... ...	,, ...	10 April ,,	445	3·8	18·9	
Pet ...	Grade Jersey ...	14 Aug., 1900	246	3·6	9·92	
Pansy ...	,, ,, ...	4 Dec., ,,	591	3·7	24·5	

The dairy herd grazed on natural pasture during the period.

Returns from 1st to 31st May, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
Rosebud ...	Ayrshire ...	10 April, 1900	535	3·7	22·17	
Ream ...	,, ...	24 July ,,	355	3·8	15·10	
Isabelle ...	,, ...	7 July ,,	444	3·9	19·39	
Lena ...	,, ...	13 July ,,	102	3·9	4·45	Dry, 20-5-01
Leesome ...	,, ...	1 Sept. ,,	701	3·8	29·83	
Ream Routhie	,, ...	20 Sept. ,,	305	3·9	13·32	
Ruth ...	,, ...	8 Oct. ,,	417	3·8	17·74	With first calf
Laura ...	,, ...	28 Aug. ,,	435	3·7	18·02	With first calf
Renown ...	,, ...	29 Nov. ,,	513	3·6	20·68	With first calf
Laverock ...	,, ...	19 Dec. ,,	342	3·8	14·55	
Blink ...	,, ...	28 Feb., 1901	946	3·6	38·26	
Annie Laurie	,, ...	25 April ,,	1104	3·7	45·74	
Bonny ...	,, ...	12 April ,,	761	3·7	32·44	
Linnet ...	,, ...	7 May ,,	864	3·6	34·83	
Ruby ...	,, ...	9 April ,,	702	3·6	28·30	With first calf
Jersey Belle	Jersey	21 May, 1900	84	6·0	5·64	Dry, 18-5-01
Content ...	,, ...	18 July ,,	115	5·2	6·69	Dry, 20-5-01
Playful ...	,, ...	14 July ,,	546	4·5	27·51	
Baroness ...	,, ...	3 Aug. ,,	326	5·2	18·98	
Carrie ...	,, ...	18 Aug. ,,	377	5·0	21·11	With first calf
Spec ..	,, ...	26 Aug. ,,	201	5·0	11·25	With first calf
Stumpy ..	,, ...	29 Aug. ,,	636	4·6	32·76	
Evileen ...	,, ...	2 Sept. ,,	487	5·5	29·99	
Beatrice ...	,, ...	3 Sept. ,,	144	5·6	9·03	Dry, 20-5-01
Connie ...	,, ...	8 Sept. ,,	524	5·1	29·93	
Ivy ...	,, ...	28 Aug. ,,	103	5·2	5·99	Dry, 22-5-01
Bashful ...	,, ...	2 Nov. ,,	336	5·5	20·69	
Effie ...	,, ...	6 Jan., 1901	645	4·0	28·89	
Russet ...	Grade Shorthorn	7 Oct., 1900	320	3·7	13·26	
Alice ...	,, ,, ...	13 Nov. ,,	656	3·8	27·91	
Stranger ...	,, ,, ...	7 July ,,	641	3·7	26·56	
Duchess ...	,, ,, ...	24 Aug. ,,	121	4·1	5·55	Dry, 20-5-01
Restless ...	,, ,, ...	3 Sept. ,,	567	3·8	25·25	
Rosella ...	,, ,, ...	5 Sept. ,,	565	3·7	23·41	
Lucy ...	,, ,, ...	27 Sept. ,,	563	3·7	23·33	
Leopard ..	,, ,, ...	29 Sept. ,,	372	3·6	14·99	
Redmond ...	,, ,, ...	12 Sept. ,,	333	3·8	14·17	
Rusty ...	,, ,, ...	23 Dec. ,,	542	3·8	23·17	
Ginger ...	,, ,, ...	19 Dec. ,,	674	3·7	27·93	
Polly ...	,, ,, ...	21 Feb., 1901	620	3·7	25·69	
Princess May	,, ,, ...	25 May ,,	112	3·8	5·76	With first calf
Peggie ...	,, ,, ...	29 May ,,	36	3·9	1·57	
Violet ...	Shorthorn ...	9 Oct., 1900	557	3·8	23·70	
Louisa ...	,, ...	6 April ,,	334	3·8	14·21	
Spot ...	,, ...	11 Sept. ,,	204	3·9	8·91	Dry, 30-5-01
Plover ...	,, ...	3 July ,,	502	3·6	20·24	
Frizzy ...	,, ...	23 Aug. ,,	401	3·6	16·16	
Laurel ...	,, ...	10 Sept. ,,	525	3·6	21·18	
Empress ...	,, ...	20 Nov. ,,	512	3·8	21·79	
Curley ...	,, ...	10 Dec. ,,	643	3·7	26·64	
Trial ...	,, ...	31 Oct. ,,	720	3·9	31·44	
Roany ...	,, ...	17 Mar., 1901	486	3·6	19·59	With first calf
Cherry ...	,, ...	11 April ,,	506	3·6	20·40	With first calf
Rose ...	,, ...	10 April ,,	672	3·6	27·09	With first calf
Kit ...	,, ...	28 Sept., 1900	502	3·6	20·24	
Gladdy ...	,, ...	29 April, 1901	991	3·7	41·06	
Queenie ...	,, ...	19 May ,,	203	3·8	8·63	
Maggie ...	,, ...	20 May ,,	182	3·7	7·54	
Pet ...	Grade Jersey ...	14 Aug., 1900	88	4·1	4·04	Dry, 20-5-01
Pansy ...	,, ,, ...	4 Dec. ,,	588	3·8	25·02	With first calf
Fancy ...	South Coast ...	21 May ,,	316	4·0	14·15	
Damsel ...	Holstein	19 Jan., 1901	867	3·0	29·13	
Dairymaid ...	,, ...	3 Mar. ,,	1042	3·1	36·17	
Lady Rose ...	Guernsey ...	15 April ,,	547	3·9	23·89	With first calf

TABLE OF MILK TESTS AT THE NATIONAL AGRICULTURAL AND INDUSTRIAL ASSOCIATION'S SHOW.

22ND AND 23RD MAY, 1901.

FIRST DAY.

	Name of Owner.	Name of Cow.	Lb. of Milk.	Per cent. Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. R. Allen	Miss Ferguson ...	11½	3·8	·48
	Mr. W. T. Bick	Daisy	23¾	3·2	·74
	Mr. Carmichael	Gentle	16	4·0	·71
	Mr. T. O'Shea	Blossom	21	2·8	·65
	Ditto	Lady Jersey ...	11¼	4·2	·52
Evening.	Mr. R. Allen	Miss Ferguson ...	9¼	4·6	·47
	Mr. W. T. Bick	Daisy	12¾	6·0	·85
	Mr. Carmichael	Gentle	12¼	3·8	·52
	Mr. T. O'Shea	Blossom	19½	3·7	·80
	Ditto	Lady Jersey ...	8½	6·0	·57

TOTALS FOR FIRST DAY.

Miss Ferguson.	Daisy.	Gentle.	Blossom.	Lady Jersey.
·48	·74	·71	·65	·52
·47	·85	·52	·80	·57
·95	1·59	1·23	1·45	1·09

SECOND DAY.

	Name of Owner.	Name of Cow.	Lb. of Milk.	Per cent. of Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. R. Allan	Miss Ferguson ...	11½	3·6	·46
	Mr. W. T. Bick	Daisy	14¼	3·5	·55
	Mr. Carmichael	Gentle	16¾	3·4	·63
	Mr. T. O'Shea	Blossom	24¾	2·8	·77
	Ditto	Lady Jersey ...	11¼	4·2	·52
Evening.	Mr. R. Allan	Miss Ferguson ...	10	5·0	·56
	Mr. W. T. Bick ...	Daisy	12	4·4	·59
	Mr. Carmichael	Gentle	13¾	4·6	·70
	Mr. T. O'Shea	Blossom	19	3·9	·82
	Ditto	Lady Jersey ...	9	5·6	·56

TOTALS FOR SECOND DAY.

	Miss Ferguson.	Daisy.	Gentle.	Blossom.	Lady Jersey.
	·46	·55	·63	·77	·52
	·56	·59	·70	·82	·56
Total ...	1·02	1·14	1·33	1·59	1·08

TOTAL FOR TWO DAYS.

	Miss Ferguson.	Daisy.	Gentle.	Blossom.	Lady Jersey.
First Day	·95	1·59	1·23	1·45	1·09
Second Day... ...	1·02	1·14	1·33	1·59	1·08
Total	1·97	2·73	2·56	3·04	2·17

MILK TESTS AT BIGGENDEN SHOW.

12TH JUNE, 1901.

	Name of Owner.	Name of Cow.	Lb. of Milk.	Per cent. of Butter Fat.	Lb. Commercial Butter.
MORNING.	Mr. Fowler	Royal	14½	5·0	·81
	L. Jones	Dorothy	15	3·1	·42
	G. H. Jones ...	Daphne	14½	3·2	·51
	Fowler	Victoria	19	2·9	·61
	Mrs. Jones	Jill	16	3·2	·57
	Mr. Fowler	Lady	14	4·0	·62
	Ditto	Darkie	12	4·2	·56
EVENING.	Mr. Fowler	Royal	10¾	4·8	·57
	L. Jones	Dorothy	8¼	3·6	·33
	G. H. Jones ...	Daphne	10¾	3·7	·44
	Fowler	Victoria	14¼	6·2	·66
	Mrs. Jones	Jill	12	5·8	·77
	Mr. Fowler	Lady	12	4·8	·64
	Ditto	Darkie	8½	3·8	·36

TOTALS.

Royal.	Jill.	Victoria.	Lady.	Daphne.	Darkie.	Dorothy.
·81	·57	·61	·62	·51	·56	·52
·57	·77	·66	·64	·44	·36	·33
1·38	1·34	1·27	1·26	·95	·92	·85

DAIRY ITEMS.

According to *Hoard's Dairyman*, if you want to get all the cream—and what dairymen don't?—there are certain things that must be done to the milk. Whether you use a separator, deep setting, or shallow setting, the milk fat must be started on its creaming way as soon as possible after it comes from the cow, and before it begins to lose its animal heat. If you let part of the milk get cold before running it through the separator the chances are that the skim milk will contain more of the butter fat than is profitable, and yet the average dairyman will let it go, rather than run the skim milk through the separator a second time. Separating at once, while the milk is warm, saves both time and butter fat.

A clever scheme for adulterating milk by which all the cream is removed, but will still pass the Babcock test, has been discovered in New York, and it is believed to have been practised to a small extent in several parts of the State. The milkman stirs into the skim milk an emulsion of fats, manufactured for medicinal purposes, much in the same way that skim milk is fixed for making filled cheese. These parts are made up of the same ingredients which enter into oleomargarine. It is said to give the milk a fine, rich appearance, and a chemical analysis is required to show that it is not butter fat.

SWINE TROUGHS.

A celebrated painter once painted a picture of pigs feeding from a trough. An old farmer declared the picture was not true to life, because not one of the pigs had his foot in the trough. On this subject of troughs Mr. E. Heller, a farmer, of Eisenach (in the *Hannoverscher Landmann*), says:—

Most farmers think anything is good enough for the pig. Probably most of our readers have felt annoyed to see their pigs, when eating, standing with their legs in the trough. Why do the animals do it? Because, in constructing the troughs, we have not taken into sufficient consideration the build of the pig's body. (Fig. 1.)

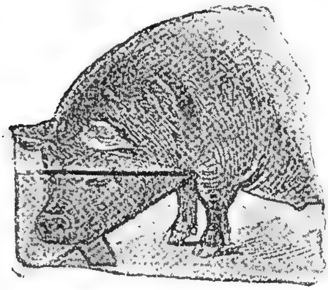


FIG. 1.—Pig Trough built to suit the pig's form.

Everyone knows that the pig has a particularly stiff and thick neck to enable it to root with vigour and seek its food from the soil. Now, it is just this stiff neck which preve nts the pig from feeding comfortably out of the ordinary troughs.

If we examine more carefully the build of pigs, we find that the shape of the trough is utterly unsuitable and wrong. The side of the trough on which the animal stands to feed is perpendicular, but the pig cannot bend its neck (nape) like a horse or cow, and consequently cannot get its snout into the trough. For this reason pigs never stand right in front of the trough, but always sideways with a foot in the food. They do not contract this bad habit of standing with the fore feet in the trough from pleasure, but of necessity, for in no other way can they get at the food. But standing in the trough results in uncleanliness and waste. Besides the upright sides, the ordinary troughs have a still greater fault, in that the bottom presents a surface too broad and flat, so that it is impossible for the pig to dispose of the whole of the food. Thus the cleansing is troublesome, and is not always done as perfectly as should be.

In order to obviate both difficulties—the uncomfortable and unnatural feeding of the pigs, and the difficulty in cleaning the troughs—I have caused a trough to be constructed as here shown (Fig. 2). At first it was made of

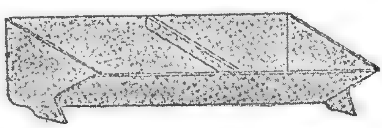


FIG. 2.—Rear view of Trough.

cement, but was found not to be durable. The cement sides were gradually attacked, lost their smoothness, and became full of holes. Latterly they have been made of enamelled cast iron.

The shape of the new trough has been retained after many years of use. As will be seen by the illustration, the far side of the trough is perpendicular. On the other hand, the front whence the pigs feed is sloped and arranged to suit the build of their head and neck, so that they can feed comfortably in a natural attitude.

It is a condition of the shape of the trough that all food runs together in the 4-inch broad semi-circular bottom, and thus can be all consumed by the pigs.

The cleaning out of the trough is also rendered easy, as a wisp of straw will carry away all dirt and waste food.

The cross beams are also of great advantage, as they prevent, when several animals are feeding together, the driving away particularly of weakly animals and the scattering of the food.

As all corners are avoided, no food can permanently remain to form acids or other uncleanliness to spoil the food. At both ends the troughs are

furnished with feet, so that they can be easily set up anywhere. They are made to suit the feeding of from one to four pigs. If more than four are to be fed, it is advisable to set up two or more troughs alongside each other.

In a very simple manner the trough is arranged so that it can be turned over so as to completely close the openings. The taps shown in the illustration (Fig. 3) may be let into the side wall or into iron lattice-work at the side.

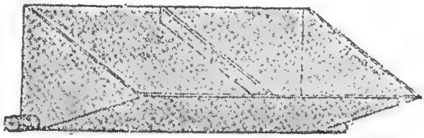


Fig. 3.—Tipping arrangement.

CO-OPERATION *V.* INDIVIDUALISM.

We reprint from *Garden and Field* a tabular statement of the enormous profits made by the co-operative butter factories of Victoria. It is said that although they have been very successful, they are not extending their business in nearly the same proportion as the private firms. Indeed, it is authoritatively stated that more than half of the butter factories and creameries in the State are either owned entirely or controlled by private firms. It would be disastrous to the milk-producer for either private firms or any but the widest co-operative factories to have a monopoly of the trade, as they could then beat him down to starvation prices for his milk. The following interesting table, just published, shows how great the profits of the co-operative butter factories are now, and it is to be hoped for the benefit of the dairy farmers that there will be a fairly even balance between the companies and the private owners, so that from healthy rivalry he may obtain fair prices for his produce:—

Company.	Paid-up Capital.	Net Profits.	Period.
Farnham	2,445	2,442	6 months
Glenormiston	4,350	3,338	6 months
Colac	4,936	3,844	6 months
Warrnambool	3,787	4,317	6 months
Glengarry	500	360	6 months
Geelong district	4,332	1,026	6 months
Kyneton	4,671	1,337	12 months
Kongwak	771	608	6 months
Yea	5,058	1,814	12 months
Poowong	2,035	922	6 months
Drik Drik	220	113	6 months
Wallace, Millbrook, and district	2,787	542	12 months
Buninyong	3,368	739	12 months
Koroit and Gower Hill	3,109	1,342	12 months
Miepoll	792	229	12 months
Tamleugh and Karramous	1,368	636	12 months
Swanhill and Morngag	837	304	6 months
Strathbogie	489	192	12 months
Hamilton	2,995	450	6 months
Pyramid Hill	1,014	407	12 months
Framlingham and Ellerslie	4,117	1,577	6 months

It will be noticed that these twenty-one companies' returns show a profit of about 42½ per cent. on the amount of capital invested, and this much can probably not be said of another five businesses in the State.

[Of factories and creameries there are in Victoria:—

	Factories.	Creameries.
Co-operative companies	116	270
Proprietary companies	33	60
Private firms	89	42
	238	372

—Ed. *Q.A.J.*]

THE DAIRY HERD.

THE PROPERTY OF THE SCOTTISH AUSTRALIAN INVESTMENT COMPANY, LIMITED, TALGAI WEST, *VIA* HENDON.

Returns from 1st to 30th June, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. of Butter Fat. Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Lilly... ...	Holstein	14 May, 1900	1,041	5·1	60·23	Heifer in first calf
Jean... ...	Jersey	30 May, 1901	674	5·0	38·14	Third calf
Victoria ...	,, ...	21 May ,,	765	4·4	37·70	,,
Jubilee ...	,, ...	19 Nov., 1900	404	4·8	21·89	Second calf
Scarlet ...	Grade Jersey ...	15 May, 1901	718	4·0	31·88	Heifer in first calf
Duchess ...	,, ,, ...	19 Nov., 1900	498	4·5	25·15	Third calf
Favourite ...	South Coast ...	6 May, 1901	675	3·4	25·25	Heifer in first calf
Bess ...	Shorthorn ...	27 May ,,	746	4·0	33·12	Third calf
Julia ...	,, ...	15 June ,,	333	5·0	18·84	,,
Jeannie ...	,, ...	20 June ,,	134	3·7	5·48	Heifer in first calf
Dora ...	,, ...	12 Mar. ,,	429	4·6	22·18	Third calf
Edith ...	,, ...	17 June ,,	230	5·4	14·11	Heifer in first calf
Trilby ...	,, ...	19 Oct., 1900	397	4·8	21·50	Second calf
Countess ...	,, ...	15 May, 1901	717	3·0	23·44	,,
Cowslip ...	,, ...	13 Oct., 1900	393	4·6	20·32	Third calf
Strawberry...	,, ...	23 Sept. ,,	360	4·8	19·50	Second calf
Nowra ...	,, ...	26 Oct. ,,	357	4·2	16·72	Heifer in first calf
Fortune ...	,, ...	15 Jan., 1901	465	3·6	18·48	Second calf
Primrose ...	,, ...	6 Feb. ,,	572	3·6	22·74	,,
Vanity ...	,, ...	3 Mar. ,,	455	4·0	20·20	Heifer in first calf
Nessie ...	Grade Shorthorn	13 May ,,	711	3·2	24·93	,, ,,
Lizzie ...	,, ,, ...	3 May ,,	563	5·0	31·86	,, ,,
Nellie ...	,, ,, ...	29 April ,,	489	3·6	19·44	,, ,,
Buttercup ...	,, ,, ...	12 Oct., 1900	405	4·4	19·96	Third calf
Dairymaid ...	,, ,, ...	24 June, 1901	86	3·8	3·62	,,
Jupiter ...	,, ,, ...	26 April ,,	720	4·0	31·97	Second calf
Dolly ...	,, ,, ...	16 Jan. ,,	506	4·6	26·16	Third calf
Rosette ...	,, ,, ...	26 Oct., 1900	401	4·6	20·73	Second calf
Milkmaid ...	,, ,, ...	17 Oct. ,,	477	4·4	23·51	,,
Jessamine ...	,, ,, ...	16 Nov. ,,	539	4·8	29·19	Third calf
Sunbeam ...	,, ,, ...	20 Jan., 1901	426	4·4	20·99	Second calf
Majestic ...	,, ,, ...	2 Mar. ,,	595	3·5	22·97	,,
Madam ...	Grade Ayrshire...	13 Mar. ,,	570	4·0	25·31	,,
McCaffrey ...	,, ,, ...	8 Oct., 1900	319	4·8	17·28	Third calf
Mermaid ...	,, ,, ...	23 Jan., 1901	500	3·6	19·88	Second calf
Trimmer ...	,, ,, ...	11 Dec., 1900	525	3·7	21·47	,,
Spec... ...	,, ,, ...	31 Oct. ,,	397	3·4	14·85	,,
Marjorie ...	,, ,, ...	10 Jan., 1901	491	4·2	22·99	,,
Emma ...	,, ,, ...	21 Mar. ,,	510	4·0	22·64	Third calf
Charity ...	,, ,, ...	23 Jan. ,,	517	3·8	21·77	Heifer in first calf

Cows grazed on bush grasses and green barley during the period.

AUBIN DOWLING, Manager.

The Horse.

PROTECTION AGAINST CRIB-BITING.

One of the most troublesome habits which horses contract is that of crib-biting. It follows frequently upon indigestion. There are many suggested methods of prevention, but the following from the *Farmers' Advocate* has the recommendation of simplicity. Our contemporary says that once started the habit was very difficult to stop. The only humane method was found in muzzling. A muzzle, such as represented in the accompanying figure, was made. The muzzle is made of 1-inch half-round iron, riveted on to the halter, and worn always in the stable. It is made in the flat in this manner, the ends are bent at right angles at A (Fig. 3), and are riveted on to the cheek straps of

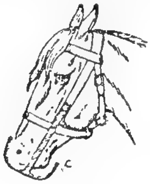


Fig. 1.

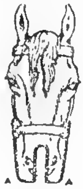


Fig. 2.

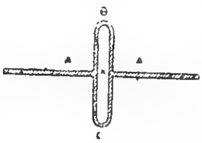


Fig. 3.

the halter. The round ends B and C are curved upwards in such a manner as to come over the nose and under the lower lip of the horse, so preventing him catching hold of anything with his teeth, at the same time allowing him to feed and breathe freely. The width across the muzzle (Fig. 3) at X is 2½ inches. The plan is worth trying.

BREAKING-IN COLTS.

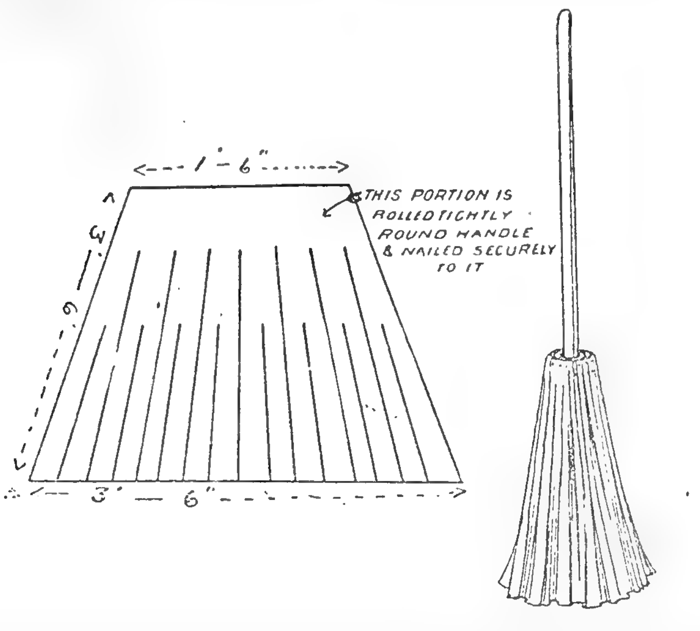
Mr. James Gray lately read a paper on "Breeding Horses" before the Amyton branch of the Bureau of Agriculture, South Australia, and touched amongst other matters on the breaking-in of colts. On this head he remarked:—

Some seem to think if a man has plenty of courage and can stick to anything he can get a saddle on he must be a good colt breaker; but he very often breaks him down instead of breaking him in. A colt should not be worked or ridden too hard to begin with, as it will not do him any good. Every farmer that breaks in his own colts should have a small post and rail yard that will hold a colt. It is not a good plan to headrope or lassoo a wild colt, as it very often hurts the muscles of the neck. A better way is to have a light stick, about 6 feet long, that can be used with one hand; tie a piece of bright-coloured rag on one end to attract the colt's attention, and work him around the yard with that until he will let you get up to him; any colt can be caught in this way. You must be able to control your temper before you try to control a colt. If you lose your temper sit down and have a smoke; when you start work again you will find both yourself and the colt all the better for a few minutes' rest. Never let a colt know that you are afraid of him; if you do, it will take a long time to master him, and you might have to find a shorter way out of the yard than through the gate. Do not jump away or fall over every time the colt lifts his leg or switches his tail; if you do, he will surely keep you at it. They should be well mouthed and handled before putting them to work, especially for hacks and buggy sorts. Care should be

taken not to give young horses a one-sided mouth when driving or riding them. Do not ride all over them, or lopsided like a butcher's boy, which will soon give them sore backs. They should be ridden or driven with a firm rein, which helps a horse and prevents him from stumbling. Do not whip or knock a sulky colt about to get him to work; if you do, he will never make a good horse; but if left until the sulks go off he will make a first-class worker. I have had colts go for four days without tightening their chains, but after they went to work they were all the better for having their own way. It is better to leave a colt until he is four or five years old before breaking him in; he will make a better horse and will stand longer than when put to work too young. They should be securely harnessed and worked with a good leader in front of them, which will prevent them from doing much harm. I have found that colts treated in this way usually give very little trouble, and, as a rule, make good workers.

A GOOD FIRE-BEATER.

A valued correspondent kindly sends us (*Pastoralists' Review*) the following:—For fire-beaters I find nothing surpasses the greenhide cat-o'-nine-tails, cut as shown below, and nailed on to a light 4-feet broom-handle by



cutting the hide as shown. The beater is made much lighter and the "fall" greatly improved, and no hide is wasted, as the next beater is cut end for end. The advantages of such beaters are that they never wear out, lasting from year to year, and are always to hand and improve with work.

Poultry.

POULTRY RAISING IN BELGIUM.

THE "POULET DE BRUXELLES."

Every industry can profit by what is being done in other countries in the same business. If people do not look beyond their own fence and find out what their neighbours are doing, they must not expect to get out of their own narrow groove, or to increase the production of any given article by profiting by the more enlightened methods adopted by others. Thus the coffee and rice planter do well to study the cultivation and preparation of these products in India, Africa, Java, Brazil, and other tropical countries. The sugar planters have eagerly availed themselves of the Hawaiian experience of Dr. Maxwell.

In the same way poultry-breeders in this State may think they know all that can be known about chicken rearing, egg production, feeding of fowls, preparing them for exhibition, &c. Still, they do not know everything, and many a good hint has been picked up by them from English and foreign newspapers. Now, here is something from Belgium which will be of interest to practical poultry-breeders.

The American Consul-General at Antwerp, in a report on poultry raising in Belgium, says:—

The succulence of the "poulet de Bruxelles" has a very widespread reputation, not only among gourmets, but among all who have had the good fortune to travel upon the Continent and meet the same on the table.

The difference in quality between the fowl above mentioned and one of the same age and size of the ordinary variety is shown by the fact that the first is sold in nearly all the markets in this country at double the price. For example, a young "poulet de Bruxelles," which we should consider about the size sufficient for a meal for two persons, is sold to-day for 5f. (4s. 0½d.), whereas one of the ordinary variety can be purchased for between 2f. and 3f. (1s. 7½d. to 2s. 4½d.).

The excellence of the fowl seems to depend, as far as can be ascertained, on the careful manner in which the sitting hen is treated, the cleanliness observed about her, as well as the careful feeding of the young chicken until sufficiently developed for eating purposes. Whether or not the methods pursued here differ from those followed by careful breeders in our country, it is impossible for me to say. Travellers almost invariably express their astonishment at its tenderness and juiciness.

The choice of eggs for sitting purposes is considered a matter of great importance, and the freshest obtainable are almost invariably used. The best breeders seldom take eggs older than eight days for raising the best quality. Care is taken that the eggs given to one hen should be of the same age. The eggs, when collected, are kept at a very even and medium temperature until given to the hen, and are turned daily. This measure is taken, I am informed, to prevent the yolk, which is lighter than the white of the egg, from adhering to the top of the shell. The eggs chosen for the purpose above mentioned are also of an average size, those above medium being rejected, as they often contain double yolks. Eggs received from a distance, and consequently exposed to more or less shaking, are allowed to stand a day or two before being put under the hen. Great care is also taken that the eggs should be perfectly clean.

The nest is prepared of straw or cut hay, perfectly clean, dry, and odourless. As a rule the sitting hens are located in corners where the greatest quiet is obtainable, and are not exposed to great light. When so located they are not disturbed for any other purpose than the placing before them of their

daily supply of food and water. As the hen leaves her nest at least once a day to search for food, to take exercise, &c., care is taken to put her food and water within reach of the nest, in order that the time that she is off the eggs may be materially shortened.

RAISING AND FEEDING.

When the young bird is hatched it retains in its body part of the yolk of the egg from which it was produced, which suffices to nourish it for the first twenty-four hours, during which period only warmth is required, which is furnished either by the mother hen or must be afforded by a warm cloth, in case of the necessity of awaiting the hatching of the rest of the brood.

The food first given can be varied, but must be made up of ingredients containing large quantities of nitrogen, as this is required for the formation of the tissues. It is necessary, in fact, that the food should be composed of matter resembling in character an egg, together with milk. It is customary to mix the food with eggs, milk, and the blood of earth worms, field worms, and that of a commoner variety of fish; also to introduce, for the formation of bone, certain quantities of phosphate of lime found in grain and flour. In the early days flour should be given, on account of the facility of its digestion, grain being substituted therefor as the birds begin to gather strength. Wheat flour is generally used. The grain given is wheat, rice, millet, buckwheat, and corn, raw or cooked. Cooked potatoes are also often given as a change of diet. It is customary to vary the grain diet as much as possible, and to frequently administer it mixed. The food ordinarily employed is made up as follows:—Hard-boiled eggs and wheat flour are mixed in milk, a little water being added. To this paste is added a small onion finely cut up, together with lettuce when green food is scarce. The mixture is ordinarily quite stiff, as too moist food is considered harmful for the young brood. After the first few days a small quantity of whole grain is mixed into the paste, but if rapid development is desired the simple paste should be continued alone.

Great care is taken to keep the young brood in a dry, warm locality, which precaution, together with the proper food, prevents inflammation of the intestines and like troubles. As a rule the birds are confined on wet days, and allowed to run about as much as possible only in fine, sunny weather. In winter a more generous diet is given to enable them to withstand the cold. The daily ration of grain for the fowls is from 2½ oz. to 3 oz.

RATS IN THE POULTRY YARD.

The systematic raid upon rats which has been made in Brisbane by the municipal authorities has proved a boon to those who rear poultry in the city and suburbs. Still, there is occasionally trouble with these ubiquitous rodents when young chickens are plentiful. From an English exchange we take some notes which may be of value to poultry-owners:—

It is next to impossible to entirely escape loss, and when a rat manages to get at the chickens he does considerable damage, owing to his habit of killing all he can, though one or two victims content his appetite. It is this lust of killing, and his amazing cleverness in avoiding trapping or capture, that render him so formidable an enemy to the poultry yard. Elaborate traps are useless, but the ordinary iron spring trap often used to catch rabbits are sometimes successful.

Suppose rats' footprints are discovered round a chicken coop when visited in the morning, the trap should be set the same evening after the coop is shut up for the night. It should be sunk in the ground on the path the rat has traversed, lightly covered with earth, and a little chicken food sprinkled over. The trap should be handled with gloved hands, as the rats' scent is abnormally keen; and, if set with skill and its presence concealed effectually, the rat not infrequently walks in the same night.

Rats in a storehouse can be caught with these traps in a similar way. Supposing the poultry food is kept in casks, as it often is (empty casks, which the grocer will generally sell at 6d. or 9d. apiece, make excellent bins for a sack of meal or corn, and if stood on a dry floor will last for years), and rats begin eating it from the top, set a couple of traps in a meal cask full to within a few inches of the top. Just cover them with meal, placing them 3 or 4 inches from the edge. When the rats return to the cask they jump in unsuspiciously, and one will walk into the trap. This plan seldom fails, and by covering up all the casks but the one with the traps in it they are bound to go to it.

Catching them out of doors, if the steel trap fails, is by no means easy. There only remains poisoning, and a certain risk invariably attaches itself to this means. A favourite dog or cat not infrequently finds the poison before the rats, in spite of all precautions. The safest poison, if poison must be resorted to, is plaster of Paris, which can be bought at any chemist's. It is a white powder, should be mixed with an equal quantity of poultry meal, sharps or barley meal, and three or four saucers of the mixture should be put down in places which the rats frequent. The rats, it must be confessed, do not die painlessly, for the stuff, once swallowed, turns into a hard mass and causes a stoppage. But it kills them, which is the main thing; and a poultry-keeper, after a rat has wantonly killed a dozen ducklings in a single night, need feel no tenderness towards these bloodthirsty brutes. The advantage of plaster of Paris is that wandering fowls, dogs, and cats, or any quadruped will not touch it; and it has the additional merit of cheapness. Phosphorus paste is another effective poison, if used fresh. A threepenny bottle of it, spread on bits of bread and butter, will kill many rats, and it has great attraction for them.

When the weather is warm enough for poultry-keepers to dispense with bottom boards to the coops, 1-inch mesh wire netting should be used in its place, unless the coops stand on perfectly level, hard ground. A rat will not burrow under level, hard ground, but, if the land is unequal and there is a tiny hole owing to this cause, he will enlarge it and insinuate himself through. It is best to use loose pieces of netting to protect the coops, and turn them up at the edges, as this saves knocking nails into the wood. Bricks set round the coop will protect it from rats, but the netting is safer. The front board should always fit securely. When the coops are home made this point should be remembered.

Ducklings and goslings must be protected from rats till quite big, as they prefer them to chickens. It is when rats have tasted blood in the poultry yard that they are most troublesome, and will even chase and kill chickens in broad daylight. If the young stock are securely protected at night, and no food is left lying about, there is far less fear of rats developing into a danger. To put it bluntly, it does not pay to raise poultry if rats decimate the stock, and if the poultry-keeper is not clever enough to keep down loss from this head to an insignificant number he had far better give up poultry raising altogether.

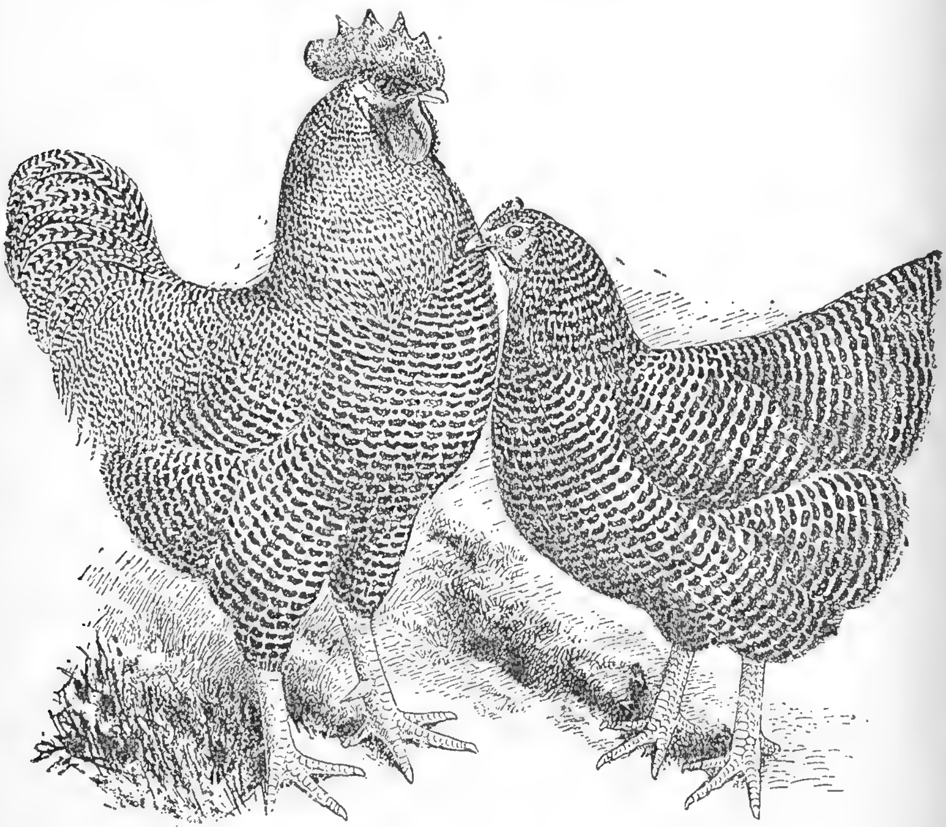
FAVUS IN POULTRY.

Favus in poultry forms the subject of a leaflet issued by the Board of Agriculture. The disease is due to a minute fungus which attacks the comb, wattles, and necks of birds, and causes the feathers of the latter to fall off; sometimes one side only on the neck may be affected, becoming quite deplumed, whilst the other shows no signs of invasion. As a rule, it is the comb that suffers first and most from the attack. The disorder is common to man, the cat, dog, and rabbit, and is particularly prevalent in rats and mice. It is rarely met with, however, in human beings in England. It is very destructive in poultry-yards, and, being highly contagious, often spreads with great rapidity. A single diseased cock soon contaminates the whole run, and several outbreaks have been traced to a new male bird from an affected yard. Care should be taken in handling patients, as the disease can be transmitted to man, on whom it is not so amenable to treatment as in birds. It is probable, however,

that the disease can only be planted either naturally or artificially on an abraded surface. The treatment consists in bathing the invaded parts with warm water and soft soap, and then applying some ointment to destroy the parasite. Nitrate of silver well rubbed into the comb and wattles has been found of great benefit; an ointment of 5 per cent. of the nitrate of silver in lard may be used for this purpose. Red oxide of mercury one part, to lard eight parts, has proved an excellent remedy if used for several days. It is most essential to well foment the diseased parts previously to applying the ointment, and to remove as far as possible all the favic crusts with a blunt knife. One cannot be too careful in examining a fresh bird before turning it into the run, which, needless to say, should not be done if any signs of favus are noticed upon it. Should the disease appear, the bird should be at once isolated and treated, as when the parasite reaches the feathered tracts it is so much more difficult to eradicate.—*Exchange.*

PLYMOUTH ROCKS.

The *Feathered World* says of the splendid Plymouth here reproduced, that their colour and distinct barring is as near perfection as it is possible to get. The cock is a big, broad-backed, 14-months-old bird, of excellent shape, perfect in his barring all through, whilst his tail and flights are totally free from white, a great failing with many of the adult barred Rock cocks of the present day, as Australian breeders are well aware. This grand pair of fowls has won for the owner, Dr. Jackson, of Carnforth—the pretty little North Lancashire town on the shores of lovely Morecombe Bay—the £50 Manchester Cup, chief amongst prizes too numerous to mention.



IN-BREEDING.

ITS USE TO THE POULTRY-KEEPER.

This is a subject of considerable interest to poultry-breeders, but one which is very little understood. Nothing is more common than to read wholesale denunciations of the system from the pens of amateur poultry-keepers, and many others who have not even a superficial knowledge of the subject, but who like to air their views on that or any other subject if they can only get people to listen to them. The experienced breeder knows how wrong such ideas are, out he seldom takes the trouble to confute them.

To what class of poultry-breeders is in-breeding of most service? To the fancier, undoubtedly. Without its aid he would never know what results he should expect from any mating, and the result of many a season's breeding would be unsatisfactory in the extreme. At great expense he might have got a beautiful pen of birds together, with a typical unrelated male at the head of it; just such a pen as most people would say ought to breed a preponderance of first-class stock, and yet, at the end of the season, he would be amazed as well as disappointed to find that not 5 per cent. of the produce were fit for the show-pen. On the other hand, had the male bird stood in the relation of, say, nephew to the hens, and he had been well bred on the other side, there would probably not have been more than 10 per cent. of real rubbish in the whole progeny. We do not mean to say that the whole of the remainder would have been fit for the show-pen, but a very satisfactory proportion of them might reasonably be expected to be so, and the balance fit for the breeding-pen or for sale as breeding stock at more or less remunerative prices.

NOT PRACTICAL IN ALL CIRCUMSTANCES.

It is not possible to practise in-breeding successfully under all circumstances. It would be great folly to in-breed birds whose constitutions were defective in any particular whatever, and it would be a great waste of time to in-breed birds which had any marked external fault. For we must remember that although in-breeding when judiciously used can be made to intensify all the good points of a fowl, it also intensifies all the bad ones, too. If a hen is of sound constitution, is a very good specimen of her breed, with no very marked fault about her, she may be safely mated with a related male equally sound, and especially if he has points which counterbalance any little external faults she has, and *vice versâ*; for we must remember there is nothing absolutely perfect in any domain of stock-breeding. From such a mating strong, vigorous birds will result, some of them probably better than their parents, and most of them very typical of their breed, just such a flock as the fancier loves to possess. Particularly in well-established breeds will this be the case, although we must look for something not quite so good in the later introductions which have not yet had time to settle into a fixed type. Without in-breeding the propagation of new breeds is hopeless, with its aid the work is uphill for a long time, but every year bringing the marks of a new race into bolder prominence, until the general type stands out clear and distinct, and capable of reproducing itself for all future time.

Even in breeds which have been established for forty years or more the union of totally unrelated birds often produces in the first season almost worthless offspring from a standard point of view. But if the best of such progeny is mated back again to the parents, the pullets to the sire, and a cockerel to the old hens, the difference is at once surprising. A large proportion of the progeny from either of these matings is most satisfactory, and if the same thing is continued for another season, or for another two, for the matter of that, still better results are obtained.

HOW FAR CAN IT BE PRACTISED?

How far can in-breeding be safely practised with stock of originally sound constitution? We doubt if anyone living can answer that question. For ourselves, and chiefly as an experiment, we carried it on without a single

break, and from very close relations, for five years, and at the end of that time our stock was as large, as healthy, as fertile, and as prolific as they were the first season. We then dispersed the breed on which we tested it thus far, although on other breeds we have often practised it, although never for so long a period without a break. We do not for a moment advocate the breeding of close relations for such a period without the introduction of a single drop of fresh blood; we repeat, we deliberately did it as an experiment, in order to practically test the outcome of prolonged in-breeding on the progeny of a well-selected pair of healthy birds.

Probably there are few, if any, fanciers of note who do not owe their success very largely to a system of scientific in-breeding. One well-known judge once told us that so-and-so (a prominent breeder of modern Game fowls) had casually mentioned to him that he was thinking of introducing a little fresh blood the following season into his strain, "as he had not done so for the previous seven years." His strain was almost world famous.

Long ago, when cockfighting was a legal sport, many strains were so carefully guarded, and the dread of deterioration from alien blood was so great, that some remained uncrossed for over twenty years.

IN OTHER REALMS OF NATURE

the closest in-breeding prevails. Among freshwater fish it is universal; birds of almost every species, the wild deer, game of all kinds, the wild horses of the plains of South America, and we have no doubt hordes of savage animals, all live under this law. Finally, we must all admit that the abominable rodent known as the rat is a most prolific animal. We doubt if in all creation there is any animal which lives and breeds so incestuously as the rat. If in-breeding was an unmitigated evil, it would soon disappear off the face of the earth, but we all know whether it is likely to do that or not.

Again, all our best strains of cattle, horses, sheep, and dogs have been brought to a high pitch of excellence by a judicious system of in-breeding.

To the utility breeder of fowls, is the system of much use? It is useful, certainly, even to him; but as he has little inclination, as a rule, to treat the subject scientifically, he is safer to let it alone. It comes in useful this way: if a man has brought out a specially good laying strain and does not know very well where to get a male bird from an equally good strain to keep up the quality of his birds, his best plan is to acquire a hen with the reputation of being a first-class layer, cross her with one of his own cockerels, and retain the males produced as breeders with his own flock for future seasons. This will keep up laying qualities with far greater certainty than introducing a chance cock from another strain, with no positive knowledge of what he is likely to do.—R. G., in *Farmer and Stockbreeder.*

GRAFTING WAX.

Rosin, 4 parts (by weight); beeswax, 2 parts; tallow, 1 part. These ingredients are to be melted together, slowly, and thoroughly mixed. In about twenty minutes the compound will be ready to pull like toffy, and a convenient portion of the melted mass is then poured into a bucket containing cold water. Very soon it will be cool enough to take out and work with the hands—which must be greased with tallow (not too much) before lifting it out: this in order to prevent the wax from sticking to the hands. When worked until it becomes pale yellow in colour it has been pulled enough. and it may be made into balls (or rolls) of convenient size, and placed in cold water (in a different vessel from the first) to harden. This process is to be followed up so long as there is any of the melted mixture remaining. The rolls (or balls) are then put away, to be ready when required. This wax stands the weather well.

The Orchard.

FRUIT FROM OLD MELON SEED.

A writer in the *Gardeners' Chronicle* describes his experience in raising melons from old seed as giving better results than from young seed. His observations, which entirely confirm that of previous observers, are as follow:—"In a small melon-house I noticed two plants, which were very vigorous, and survived the first crop. They produced a good second crop of female flowers, but somewhat smaller, as were the male flowers, than usual. In the same house was a batch of young plants, with good male blossoms. I fertilised the females of the older plant with the pollen from the younger. The crop of fruit was nearly double that of the first. The fruits were large and of excellent quality throughout. A year or two afterwards, having to supply ripe melons in May and onwards, and having noticed that plants from old seed produced a less succulent growth than did those from young seed, for four years I raised my plants from old seed, always growing a few plants from new seed. I then fertilised the female flowers of the older plants with the pollen of the younger, which plants were invariably the more robust. The resulting fruits were more reliable in good quality, and, though the female flowers had been small, the fruits were large, weighing from 3 lb. to 7 lb." Mr. Henslow has given very similar experiences on the Continent in his "Origin of Floral Structures," p. 247. M. F. Cazzuola, in addition, found that melon plants raised from fresh seeds bore a larger proportion of male than female flowers; while older seed bore more female flowers than male.

TO GROW WATER-MELONS CHEAPLY.

The lowest depth of cheapness in growing water-melons has, we think, been reached by Mr. S. Eaves, nurseryman, in Brisbane. The seed of melons grown last summer was thrown out into the garden, where it germinated and produced vines, which in May bore excellent fruit. Two distinct crops of melons in one season seem phenomenal, but there appears to be nothing impossible with such a soil and such a climate as Queensland is blessed with. The *Australian Field* says that water-melons can be grown to excellent advantage in connection with corn or cotton, which should be planted as early as the season will permit of, leaving place at proper distances apart, say 10 to 12 feet each way, for the melon hills. It is best to have no other plants with the corn or cotton, as the case may be, except the melons, which should be planted sufficiently close to amount virtually to a melon patch. All farmers of experience know that if there is a sufficiency of grain of any kind on the ground to make a full crop there is no room for anything else while said crop is growing. Hence the necessity for leaving spaces of 4 to 5 feet in which to construct the melon hills. If this arrangement was not made at planting time, a proper number of stalks should be removed to make the necessary room.

The fruit of a vine will be worth more than that of the stalks removed. The vines run out to bear where they will be of but little or no detriment to the corn or cotton. Hence there is an actual gain in growing this joint crop, and especially when the first crop (corn) goes into decline before the melon crop comes on.

It is generally conceded that commercial fertilisers are better than other manures for melons. A fertiliser composed of the following ingredients may, therefore, be employed:—Nitrogen, 3 per cent.; available phosphoric acid, 8 per cent.; and potash, 8 per cent.

A few weeks before planting time construct flat hills sufficiently high to prevent damage to the plants in case of wet weather. Then apply to each hill from 1 lb. to 1½ lb. of the above fertiliser; scatter it over a space 4 feet to 5 feet across and mix well with the soil.

Any time towards the middle of summer the hills may be properly loosened up and the melon seed planted.

In lieu of the above fertiliser the following ingredients may be procured and compounded. The quantities given are necessary to make 100 lb., but any other quantity can be prepared: Nitrate of soda, 11 lb.; acid phosphate, 46 lb.; kainit, 43 lb. Apply from 1 lb. to 1½ lb. to a hill, the same as above. In lieu of kainit, muriate or sulphate of potash may be employed. To make 100 lb. with either one of said elements substituted for the kainit, the following quantities will be required: Nitrate of soda, 16 lb.; acid phosphate, 67 lb.; muriate or sulphate of potash, 17 lb. One hundred pounds of this grade is equivalent to nearly 147 lb. of either of the above, and the application should be regulated accordingly.

The cultivation should be thorough without disturbing the vines to any great extent with a plough after they commence running. The crust on the hills and beneath the vines should be broken after every rain with a long, narrow, light blade constructed for the purpose, taking proper care not to injure the vines. The grass and weeds can thus easily be kept in subjection until the first crop of melons gets half grown.

The above plan is, of course, practical for medium and late melons only.

In the same way pumpkins can be planted and cultivated jointly with corn to great advantage. By giving the corn a few weeks' start the necessary cultivation will not injure the vines.

ORANGE CULTURE IN PALESTINE.

It is pointed out in a consular report on the trade of Palestine last year that the orange gardens at Jaffa are irrigated by a water-wheel lifting a double row of buckets, and this wheel was formerly turned by from three to five mules, whose keep averaged about £12 per annum. But the stimulus given increased cultivation and the planting of gardens from 10 to 30 acres in size have necessitated the consumption of a very much larger quantity of water for their irrigation. Since 1898 about sixty oil engines have been employed in the larger plantations, two-thirds of which are of German manufacture and the rest British make.

THE STRAWBERRY CROP AT CLEVELAND.

At a meeting of strawberry-growers in the Cleveland and Wellington Point districts last week, it was stated that the coming strawberry crop in those two localities will reach 30 tons. Some have already made arrangements for the sale of their crop to the jam factories at 3½d. per lb., an advance of ½d. per lb. on the price given by the factories last year.

Viticulture.

WHAT TO GROW, AND HOW TO GROW IT.

By E. H. RAINFORD,
Instructor in Viticulture.

So many applications have been made to the writer for advice as to what varieties of grape vines to plant, soil to select, method of procedure, &c., that he has decided to write, in an article under the above title, a summary of the advice he has to give on the subject. Some points are necessarily touched on somewhat briefly; but these have been or will be dealt with at greater length in separate articles, It, however, must be well understood that some recommendations may have to be modified to suit peculiar local conditions. Queensland is a country of such a size and it is provided with so many widely different soils, climates, and other physical conditions that what is sauce for the goose is *not* invariably sauce for the gander in this State; but, generally speaking, the advice given here will be found to suit most of the conditions under which vineyards have been or will be established, and if to it, the vigneron will join any experience of his own that he has gained, he cannot fail to be successful.

It was said above that there are widely differing soils and climatic conditions which have to be taken into consideration in planting vines, but there is something else to be taken into consideration also, and that is, the different temperaments of the would-be vignerons, which would have a marked influence on the results, and which must be dealt with. To take this matter into hand, first we have the lazy man, the careless man, and the painstaking man.

To the lazy man the writer says at once, no matter where he is or what may be his soil or climate, "Plant the Isabella." It is the vine that will just suit him; it can be planted on a rock, down a well, or in a marsh. He never ploughs it, cultivates it or chips it—never prunes it, or at most a few slashes with an old scythe are made to do the business. It will bear 1,000 bunches of three or four berries each, one-half ripe and one-half green. Picking these will give the children something to do and keep them out of mischief. The vine will make an excellent hen roost at night and clothes line by day, and if he runs it into the next paddock he can lease part of it to his neighbour. In times of drought it will feed the dairy herd, and when timber is getting scarce he will get enough dead wood off it to keep the humpy in fuel for a couple of years. The best advice, then, that can be given to the lazy man is to stick to the Isabella, and don't attempt to grow any other variety.

To the careless man the writer's advice is to plant the Syrian, or White Table as it is called. He gives it an occasional chip round and some kind of an apology for pruning; beyond that he does nothing. Notwithstanding this scurvy treatment, the vine will give you plenty of shade and a good many bunches of rather tasteless grapes. Do not let him try and run other varieties on these lines, but stick closely to the Syrian.

Coming now to the painstaking man: Before the would-be vigneron puts in anything but a very small number of vines he should ask himself, "Have I the time to give them the proper care and attention they require?" If he has any doubt on the point, then let him let viticulture alone, for unless a man is able and willing to give a vineyard a thorough good cultivation, it must turn out a failure. By cultivation, not only ploughing and scarifying are meant, but rational pruning, disbudding, topping, spraying, sulphuring, &c., all of which at one time or another are requisite. A vigneron to be successful now, must grow fine-quality grapes, and that is only attained by scrupulous attention to details.

Unfortunately, many selectors have the erroneous idea that a vineyard can be cultivated at odd times when there is nothing else to do. Not so; neglect of certain details of cultivation, or even delay of a day or two, may mean the difference between success and failure. On this point the writer cannot insist too strongly: let no man attempt viticulture on any scale unless he has ample time to devote to it.

The next point to be considered by him is, which to plant—wine or table grapes. The latter give the better return per acre, but require more attention as a rule, and certainly take up more time in picking and packing; whereas wine grapes, being sold in bulk, can be grown on a larger scale. On this point much depends on the locality, nearness to railway lines, local demand, &c.

It is not at all necessary for a vigneron to make wine if he grows wine grapes; nine times out of ten he had better not do so. There is a certain and increasing demand for wine grapes from winemakers in all parts of the State.

Soil.—Before a man plants a vineyard he should closely examine his subsoil and find out if it is of a porous nature, permitting moisture to pass down freely; if it is not, he had better give up the idea of growing grapes. Some clay subsoils are porous; some are not. A good way of testing it is to sink a hole down to about 18 inches depth in the subsoil and fill with water; if all the water gets away in a few hours, the clay is porous; if, after twenty-four hours, there is still water there, it may be taken to be an impervious subsoil. If the ground is dry, the water must be filled in two or three times before deciding. If a man plants vines on an impervious subsoil, instead of being a source of profit to him, they will be an expensive worry, with disease and grape rot for their portion. With the exception of the Isabella, all vines abhor stagnant moisture about the roots, and half the disease and sickness amongst vines in Queensland arises from this cause. Drainage ameliorates the trouble, but is costly and uncertain. It is far better not to run any risks, but plant other trees or crops on such soils. If the subsoil is well drained, it is not necessary that the top soil should be rich; in fact, in too rich soils the vine does not do so well; the growth is so great, the vegetation resembles that of a scrub, entailing constant topping and tying up. If, on the other hand, this exuberance of growth is utilised to produce crop by allowing a more generous pruning, the result is a very large crop; but nine times out of ten, the grapes are deficient in colour and ripen late and badly. Moderately fertile soil of a sandy, loamy, or gravelly nature is best; granitic, calcareous, schistose, and sandstone *débris* are all good for vines, together with recent alluvials and drifts. On poor soils of a sandy nature, vines thrive well for a few years, but after that some form of manure will be necessary to keep up their strength.

Aspect.—The question of aspect is not of so much importance in Queensland as in Europe, where the warmest exposures are chosen to ensure perfect ripening and saccharine richness of fruit; here we have more sun than is required for those purposes. But in choosing a position for a vineyard care must be observed in avoiding one that is liable to spring frosts or violent westerly winds, as both these troubles will, in some seasons, considerably reduce the crop. Choose north and east if it is available; but, as said above, too much importance need not be attached to this point.

Preparation of the Land.—The ground should be broken up several months at least before planting, to allow the soil to sweeten; if a crop of corn or other produce is taken off it first, so much the better. If the soil is of a stiff consistency, like the chocolate soils of basaltic origin, it should be broken up as deeply as possible with a sub-soiler, or by running a second plough in the furrow left by the first. Trenching is superior to anything, but, as not one man in a thousand can afford to do it, it need not be discussed here. After the last ploughing, let the soil lie to sweeten and aërate for some weeks, and then run a cultivator through it once or twice to bring it into a fine state of tilth, as double the number of cuttings will strike in a finely divided soil as compared with those planted in a soil all clumps and clods.

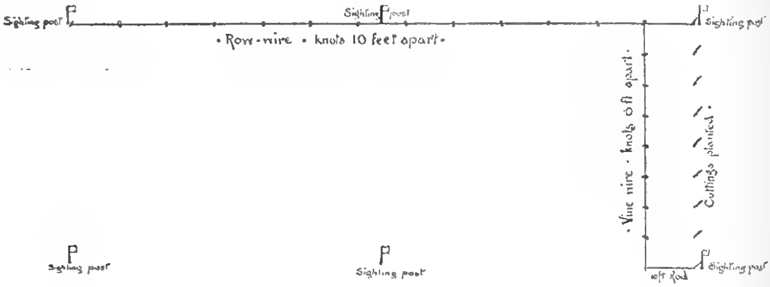
Planting.—Frequently the writer is asked the question, "Do you advise planting rooted vines or cuttings?" The answer depends to a considerable extent upon the individual circumstances. Generally speaking, the writer prefers planting cuttings to rooted vines, making a small nursery of each variety planted, to fill in blanks the following winter. Not much time is saved in planting rooted vines, as the transplanting, unless done very carefully, throws the young vines back; and it frequently happens that at the end of the season the rooted vines have not made much more growth than cuttings would have done. There are, however, occasions when it is advisable to plant rooted vines, as when the soil is of a heavy, sticky nature in which cuttings are apt to fail to strike, and also when planting varieties which are bad strikers, such as some of the American hybrids—likewise when the area to be planted is small and it is desired that there shall be no replanting—rooted vines are advisable; but when it is a matter of several acres, the vigneron will find that it adds considerably to the expense of laying out his vineyard if, instead of having to make several thousand holes with a bar, he has to make them with a shovel. The question of cuttings *versus* rooted vines resolves itself practically into one of uniformity *versus* expense, which must be decided by the bankbook.

The distance between vines and between the rows must be governed by the nature of the soil and the average rainfall. Where rainfall is wanting, the distance between rows must be increased, and where plentiful it can be diminished up to a certain point. It is obvious that there is a greater amount of evaporation from the leaves of 1,000 vines to the acre than from the leaves of 500 vines if planted the same distance between each other; and an evaporation in excess of supply means stunted wood, leaf apoplexy, and shrivelled, badly ripened berries. The same reason holds good when the fertility of the soil is taken into consideration, unless indeed consistent manuring is resorted to, which is *never* done in Queensland. The fact that 2,000 or more vines are planted to the acre in Europe does not affect the argument one *iota*, for there the rainfall is a constant factor, and manuring is made a science; besides which the average crop from one acre of 2,000 vines there, is not greatly in excess of that from 700 vines in good soil in Australia.

A good average distance is 6 feet between the vines and 10 feet between the rows, giving 60 square feet per vine, or about 700 vines to the acre. Some favour 8 feet by 8 feet, giving 64 square feet. The objection the writer has to this distance is, that if the trellised vines are to be pruned on the double Guyot or on the Royat systems, the length of wood becomes excessive, and the vine is apt to balance badly. If vines are 8 feet apart, the Bordelaise espalier or double cordon becomes obligatory for short-pruned vines; and this system has, in the writer's opinion, many objections, which have been dealt with in an article on pruning. For the Royat or unilateral cordon and double Guyot or double fruit branch systems, 6 feet between the vines is quite sufficient. Advocates of the 8 feet by 8 feet distance also overlook the fact that, in reducing the distance between the rows and increasing it between the vines, they are practically increasing the number of vines and consequent evaporation per acre. For if the vines extend to each other, they form a continuous line of vegetation, and, so far as evaporation is concerned, might be planted 8 feet 6 feet, or 4 feet apart. For bush-pruned vines it is immaterial what distance is chosen, so that the number per acre be kept within bounds.

If the vines are to be trellised, the rows should be in the direction of the prevailing winds; and if the site is on a slope of loose soil liable to wash, the rows should be across the slope to prevent it. It will happen, however, that the two latter recommendations cannot be followed out together, and one will have to be neglected in favour of the other according to local circumstances. To plant a vineyard with the utmost regularity should be the aim of the vigneron, as its cultivation is rendered easier and its general appearance made pleasing to the eye. To do so, he should have two wire lines, say, 4 or 5 chains long; on one, knots of solder are fixed at the same intervals that the vines are intended to be apart, and on the other at the distances intended

between the rows. The latter line can be half the length of the former, if preferred. String or cord lines shrink when wet or damp, and material tied on to mark the distances gets torn off or moved from its place. Two sides of the vineyard perfectly parallel are first sighted out with four or five sighting rods on either side. The wire for the rows is tightly stretched along one side in perfect line with the sighting rods, and the other line is stretched at right angles to it, the first knot of the vine wire coinciding with the first knot of the row wire. Be careful in stretching the wires that the pegs they are attached to do not give, or it will throw the lines out. At each knot on the vine wire a hole is made with a bar about 1 foot deep, the cutting put in against the knot on the wire, and the hole filled in with fine loose soil well pressed down but not too hard. When the row is finished the vine wire is advanced to the second knot on the row wire, the other end being measured off with a 10-foot rod or whatever the distance between the rows may be. A second row wire, of course, makes the work easier. The figure below gives an idea of the general arrangement:—



When the last knot is reached on the row wire it is advanced, being laid always carefully in line with the sighting rod; if this point is attended to, no vine will be more than 1 inch out of its place at the finish. Be careful in planting, not to have the butt of the cutting in the subsoil; it should be always in the top soil. Cuttings should invariably be disinfected before planting, unless it is known that it has already been done. They should be dipped for 20 minutes in a 1 per cent. solution of sulphate of copper—*i.e.*, 1 lb. to 10 gallons of water.

Varieties to Plant.—The varieties to be planted must depend upon the climatic conditions of the district where the vineyard is situated; the distance from markets, as some varieties of wine and table grapes will not stand much knocking about; and also the requirements of customers. Some of the best-known grapes will be passed in review, that vignerons may be able to judge for themselves.

To take wine grapes first. Varieties recommended for making a claret class of wine: Carbenet, Malbec, Dolcetto, B. Hermitage, Espar or Mataro.

The Carbenet and Malbec are favourite varieties in the Bordeaux district of France, and have done well in all parts of Australia; are good bearers, ripen pretty early, and are free from disease in dry climates. They do best with long pruning, but also do well with short pruning. The Dolcetto is a North Italian variety; the wine from it has colour, astringency, and full acidity, it must be sulphured in the spring, as must also the two former varieties; short pruning. The B. Hermitage is the principal variety in the Hermitage district of France, where it is generally blended with the W. Hermitage to give the wine finesse. It is an excellent all-round grape for Queensland, and will do well in all parts; it does well with both long and short pruning. The Espar is from the south of France, but is of Spanish origin. A prolific bearer, but not to be recommended by itself for a claret, as the wine is harsh and inferior to that of other varieties. The grapes should be fully ripe before

picking; short pruning. The two latter varieties are to be recommended for coastal districts.

For Wines of a Port character.—Espar, B. Hermitage, Grenache, Elsinboro, Lenoir. The Grenache is a good bearer of Spanish origin, largely used in the production of Taragona red wine, but it is very liable to fungus attacks in damp surroundings, and must be carefully looked after. The Elsinboro is a hybrid American variety, giving a fair crop of small bunches and berries like most of the Æstivalis hybrids; density of must, high in good seasons; deep colour and agreeable flavour; short pruning. The Lenoir is a hybrid American also, great cropper, and vigorous grower; makes a splendid grafting stock; wine deep in colour, of neutral character, passing for a port if sweetened up; long and short pruning, according to soil. All the above varieties may be planted on the coast, except the Grenache. Lenoir will require looking after for anthracnose.

For Light White Wines of Hock character.—Riesling, Clairette, W. Hermitage, Chardonay or W. Cluster, W. Salvino. The Riesling is a very fine variety of German origin, producing excellent wine of great aroma and quality in its own country; short pruning. The Clairette is what is called the Verdeilho in Queensland, which is incorrect; great bearer, good for blending; short pruning, and in most places free from disease. Chardonay or White Cluster: Fair bearer, giving a good quality of wine; free from disease; short and long pruning. W. Salvino: Vigorous grower, good bearer; average quality wine, free from disease; short pruning. The three last may be planted on the coast, but will require attention for anthracnose.

For Sweet White Wines and Wine of Sherry character.—Verdeilho, Tokay, W. Portugal, Malvasia, Frontignan, and the red, white, and green Salvinos. The Verdeilho, known as Madeira in Queensland, is a fair cropper, small bunches, wine of good quality and aromatic; very liable to oidium and rot; must be frequently sulphured; long pruning is best The Tokay, also liable to disease and rot in damp surroundings, produces excellent wine; good bearer; long and short pruning. W. Portugal is a Madeira variety, good bearer, and gives good quality of wine; liable to spot; short pruning. The Malvasia is found in all countries, and always gives a fine-quality aromatic wine; medium bearer, liable to oidium and spot if not carefully looked after; short pruning. The Frontignan is the Muscat grape used in wine-making; fair bearer; excellent aromatic wine if properly prepared; liable to fungus diseases if not carefully looked after; short pruning. Red and green Salvinos, medium bearers with high density musts, but the grapes are bad carriers, and very liable to rot with wet; fairly resistant to disease; short pruning.

The green Salvino is improperly called Riesling at Roma—"Grizzlings," Paddy called them.

It must be understood that only a few of the best-known varieties have been mentioned. There are many fine varieties, newly imported, being experimented with at the State farms, which will be reported upon later on.

Coming to table grapes, there is a wide choice, but those which give complete satisfaction are not very numerous. There can be no doubt, however, that many varieties now spoken of unfavourably, would do well if more attention were given to winter dressings and spring sprayings.

Very Early Varieties.—Madeleine Royal, Early W. Malvasia, Courtiller, Malingre. The Madeleines, of which there are several varieties, are a fair-quality table grape, ripening about 15th December below the Range; being thin-skinned, it is a bad carrier, liable to oidium unless looked after. The same remarks apply to the Early W. Malvasia, but it is a better carrier; short pruning for both varieties. The Courtiller is a Chasselas seedling, lately imported from France, and not fruited yet. The Malingre is a very early but poor-quality greenish berry, without much merit; short pruned. None of the above are suitable for the coast unless very carefully looked after for disease.

Early Varieties.—Sweetwater or Chasselas doré, B. Hamburg, F. de Lesseps, Blue Portugal. A dozen different grapes are called Sweetwater in Queensland; the correct vine should answer to the following description:—Young leaves bronze green, adult leaves light green with a leaden hue, glabrous above and below, generally tri-lobed with shallow sinus, small blunt teeth, long footstalk; bunch cylindrical-conical, compact or loose according to soils, not much shouldered, stalk longish, berry round, fleshy to soft according to soil, golden colour when ripe, touched with redness when caught by the sun, flavour very agreeable. Black Hamburg: Too well known to need description; should be grown everywhere with ordinary care. F. de Lesseps is a hybrid American, small bunch, white grapes; excellent flavour, fair bearer, liable to anthracnose; long or short pruning. Blue Portugal, origin unknown, certainly not Portuguese; fair quality, good bearer, but very liable to anthracnose; can only be grown in very dry localities. Chasselas doré, B. Hamburg, and Lesseps recommended for coast districts.

Medium and Late Varieties.—Illæ nomen legio est.—Black Prince, Muscat Hamburg, Muscat of Alexandria, Crystal, Royal Ascot, Mrs. Pince, Malaga, Calabrese, Morocco Prince, Gros Colman, Doradillo, &c. Crystal, Malaga, and Doradillo very liable to anthracnose—the two former especially; the latter is a valuable late white grape resisting wet; short pruned. Muscat Hamburg and Mrs. Pince are two excellent black muscats, free from disease and good for coast and northern districts, good croppers; long and short pruning. Muscat of Alexandria, the king of table grapes, but cursed with the vice of non-setting; this defect is getting more common from want of precautions in selecting canes for planting from good stocks. Notwithstanding all that may be said to the contrary, this and the Gordo Blanco are one and the same grape; the Muscat of Alexandria in Spain is called Gordo Blanco. The difference in the shape of the bunch or berries is not a variation, as the Muscat of Alexandria will have, on the same bunch, round and oval berries and on the same vine, short and long bunches; the writer has frequently seen the same thing on the Gordo, which is supposed to be a different grape. The Muscat of Alexandria is extremely prolific and a vigorous grower, but is very liable to fungus diseases and is a bad setter. To combat this latter defect, drastic pinching, sulphuring at flowering time, ringing, &c., are resorted to, but at times without effect. Experiments will be made at the Westbrook Farm this year on this point, and results published; both short and long pruning can be given. Black Prince: Too well known to need description; liable to anthracnose and rot; would not do well on coast unless carefully looked after; long and short pruning. Royal Ascot: Vigorous grower and good bearer; should do well on coast; long and short pruning. Morocco Prince: Nine times out of ten the Gros Colman is called Morocco Prince in Queensland, and the two vines are utterly unlike. Bunch of Morocco Prince is small and loose; berry large, oval, fleshy and agreeable, colour reddish purple. Gros Colman is a forked bunch; berry large and round, colour dark-red, very liable to crack in wet weather. Both vines require short pruning, and should do well on the coast. There are many other varieties of merit, but to enumerate them all would outlast a Russian winter. All the above are of European origin, but there are, however, many varieties of American hybrids which should be mentioned. Although, generally speaking, the size of the bunch and quality of the berry of American varieties is inferior to that of Vinifera varieties, especially in the defect of the slimy pulp so frequently met with, yet their freedom from disease makes the Americans favourites all along the coast as far north as the vine is planted. The varieties to be recommended are:—Concord, bunch medium, berry round, colour black; Delaware, bunch small, berry round, colour red; Iona, bunch large, berry round, colour red; Goethe, bunch large, berry oval, colour amber; Miles, bunch small, berry round, colour black; Alvey, bunch small, berry round, colour black; Rulander, bunch small, berry round, colour red.

Cultivation.—Vines should be ploughed twice a year; the first time to about the end of May, and the second towards the end of August. The first ploughing should be away from the vines to the centre of the space between the rows, the object being to allow the soil round the roots to well aërate, as this invigorates the vine and induces healthiness; the second ploughing at the end of the winter throws the soil back again to the vines. Do not listen to those who say one ploughing a year is sufficient; in soils at all inclined to be heavy it is utterly insufficient. Ploughing breaks up and brings to the surface soil ordinarily out of reach of the action of air, light, and rain. These latter chemically decompose the soil, which yields up fresh supplies of plant food at every ploughing. Vines on soils insufficiently ploughed cannot give as good a crop or be as healthy as those on soils properly ploughed. Ploughing should from the first, be deep. Some surface roots will be broken, which will do no harm; the vine soon learns to send its main roots below the depth of the plough. Pruning off surface-roots is advisable if the vineyard is small, but for a large vineyard the work is long and troublesome. The plough will do it roughly, but effectively. The cultivator should be kept going when weeds are getting the upper hand, when the surface cakes after rain, or when the ground cracks from drought. The number of scarifyings will, therefore, entirely depend upon the soil, season, &c. Never let couch or nut grass get a hold in vines. Do not be content with running a cultivator through the rows, leaving the weeds to seed in the strips between the vines. It looks bad, and does not pay in the end. Chip them as soon as the scuffling is finished.

Trellising.—If the vines are to be trellised it is better to trellis them the year after they are planted, if the soil is fertile and they have made a good start, otherwise stakes will have to be provided the second year, which would be an unnecessary outlay. If the expense can be borne, the writer strongly advises trellising the vineyard; the crop will be larger, the quality of fruit finer, and the risk of fungus attacks and rotting of fruit from wet considerably reduced. Most people are content with a two-wire trellis, the stock being trained on the lower wire and the canes tied to the upper; but this is insufficient, and not less than three wires should be used, otherwise short topping will be necessary, which is injurious, and the fruit runs the risk of being sunburnt with consequent wilting and uneven ripening. The vines at the State farms are on five-wire trellises, the second wire being double, a wire fixed with staples passing on either side of the posts, which are put in sideways, and are 3 to 4 inches thick. The young shoots in the spring grow up between the two wires, reducing damage by wind to a minimum, and doing away with tying up. The first wire on which the stock is trained is 18 inches from the ground, the double wire 12 inches higher, a third 12 inches higher, and a fourth 15 inches from the third, or about 4 feet 9 inches from the ground. The number could be reduced to three for most places; but the incessant winds at Westbrook and Biggenden necessitate closer wires to prevent breakage. The posts are 24 feet apart, and sunk 2 feet 6 inches deep; strainers are sunk 4 feet. The soil of these vineyards is very yielding in wet weather, and requires deep trellising. In sandy or gravelly soils, posts and strainers could be put in less deep. No. 8 wire is used for training the stock on, and No. 10 for the rest. Vignerons unable to spend much on trellising must put in lighter material; but the trellising of the State vineyards is described that an idea may be given of how a good substantial trellis should be put in—not necessarily for imitation. The lowest wire can be more than 18 inches from the ground; but do not put it too high, as it gives too little height for the shoots to grow before being topped, which is universal and carried to deplorable lengths or rather shortnesses.

Staking.—If the vineyard is to be bush-pruned and not trellised, the young vines must be staked the second season, otherwise the force of the wind on the strong growth will cause distortion and breakage of the thin stems; the stakes should be about 5 feet long and 3 by 3 inches or 3 by 2 inches, driven firmly into the ground. Unless there is constant supervision in tying up, there will always be damage to rank growers like the B. Hermitage; to avoid this, the

writer, at the Westbrook Farm, has adopted the following system. Three sawn stakes, 5 feet by $1\frac{1}{2}$ by $1\frac{1}{2}$ inches, are driven round the vine in the shape of an isosceles triangle, and the top brought together; a wire ring encircles the three stakes at about 2 feet from the ground. In this way breakage by wind is most impossible, and tying up reduced to a minimum.

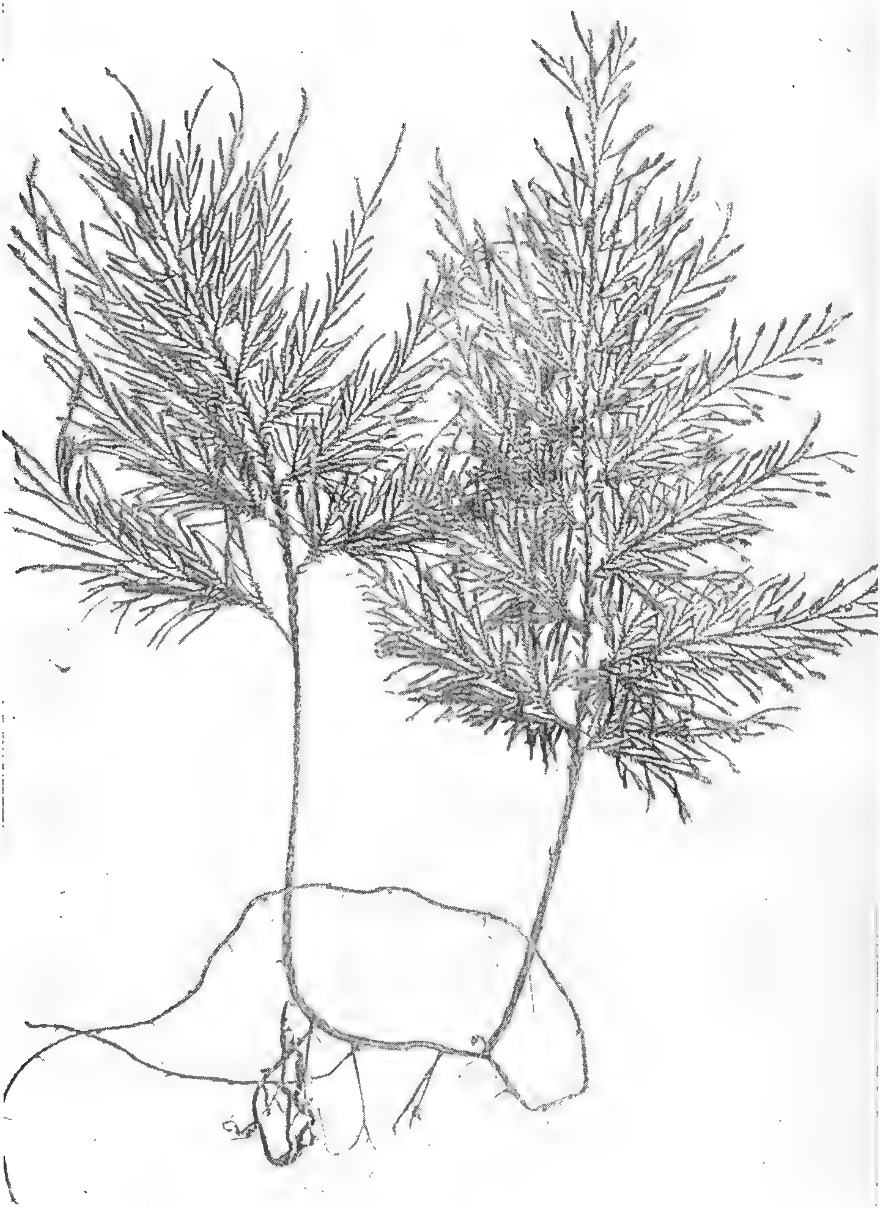
PREVENTION OF DISEASE.—If the cuttings or rooted vines were properly disinfected before planting, it is improbable that they will be, the first year, affected with fungus disease. The following winter all the plants should, after pruning, be painted with a solution of 1 lb. of commercial sulphuric acid to 1 gallon of water The proper time to apply it is just before the buds start to swell, and it is utterly useless to apply it earlier in the season. Another solution is 4 lb. of sulphate of iron, $\frac{1}{2}$ lb. of sulphuric acid, and 1 gallon of water. Put on old clothes when using it, and paint the whole vine, especially the spurs. This dressing will in most cases be sufficient to keep off disease, but some vines being very susceptible, and more especially in damp localities or on the coast, subsequent treatments may be necessary.

Vignerons must always bear in mind that an unhealthy vine is more easily attacked than a healthy one, and that stagnant moisture at the roots, improper pruning, poverty of soil, or improper cultivation are causes of sickness in vines. Prevention is better than cure. But some varieties, however well looked after, will suffer from fungoid attacks—*i.e.*, oidium or powdery mildew and anthracnose or black spot; and to prevent these, timely sulphuring and spraying are indicated. Sulphuring should, as a rule, form part of the cultivation scheme, and every season sulphur should be dusted on the young shoots when about 4 inches in length, and again on the young grapes, after setting, when of the size of large shot. The young grapes should be well shaded at the time. Bellows are sold for the purpose, but a fine muslin bag or fine flour dredger acts just as well and are less cumbersome to handle. For anthracnose timely spraying is indicated, although some authorities recommend dusting the vines with powdered sulphate of iron, lime, and sulphur. The three sprays used by the writer have been described in the *Journals* for July, 1898, p. 62, and February, 1899, p. 124; there is not much to choose between them, and readers can take their choice. The great point, however, to be observed in these sprayings is their *timeliness;* nine times out of ten they are given *too late*—that is, when the spot is already showing. To a certain extent it prevents its spreading, but the damage to flower, fruit, or wood has already been done when the spot shows. Now, for the spores of these fungi to be able to germinate a certain degree of atmospheric humidity is necessary, for it will be noticed that during continued dry weather they seldom appear—that is, if the vines are in dry surroundings. The conditions most propitious for their germination are during muggy, foggy, damp weather, or after spring and summer rains, when the evaporation from the hot soil saturates the air with moisture, which is deposited as heavy dew at night. It is at this time that spraying should be applied with the effect of nipping in the bud the nascent fungus attacks. If vignerons would bear this advice in mind and hasten to spray their vines within twenty-four hours of wet or muggy weather, the attacks of anthracnose, and oidium also, on the most susceptible vines will be diminished. When grapes are full grown and ripening they are much more resistant, and precautions may be dispensed with.

WINTER PRUNING AND SUMMER PRUNING.—These two subjects are too comprehensive to be included in this article, and, besides, they have already been dealt with in former numbers of the *Journal*, to which the reader is referred. There are various other details connected with viticulture, such as grafting, drainage, &c., &c., but these do not come within the scope of the present subject; they will be taken in hand in the near future.

The various details of viticulture dealt with in this article have necessarily been touched upon somewhat briefly, but the writer trusts that even so the advice given may prove of some assistance to those who intend to give it a trial.

Plate II.



Selaginella *Palu-pula.*

Plate III.

The Stink Grass of Brazil.
(Melinis minutiflora, Beauv)

Botany.

CONTRIBUTIONS TO THE FLORA OF NEW GUINEA.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

Order LYCOPODIACEÆ.

SELAGINELLA, Spring.

(Series—Caulescentes. Group—Flabellatæ.)

S. Palu-palu (Aboriginal name), *Bail.* The rhizome creeping and forming rather dense patches of erect stems 5 to 8 in. high. The upper decompound portion of stem deltoid in outline, 3 to 4 in. long, and about as broad near the base, branches rather close, branchlets flat, scarcely ½-line broad, the end ones much elongated, the lower half on the stem simple and scarcely exceeding ¾-line in diameter. Leaves of stem and branches rather distant, about 1½ line long, lanceolate, closely sessile, base subauriculate, margins serrulate, midrib prominent and nearly central. Spikes squarrose, slightly exceeding 1 line without the minute sterile tip. Bracts ovate, tapering into filiform points, margins broadly scarious in the lower part and, as well as the midrib, serrulate. Spores white, much exposed.

Hab. : Eastern New Guinea, on steep hill-sides, generally under overhanging stones in dense shade, *S. G. Roberts.*

This beautiful new species in some respects approaches *S. Muelleri*, Baker, in Journ. Bot. 1885, 122, of which I have no specimens. I may further remark of the present species that its erect stems curve gracefully backwards, that the central pinnæ are lanceolate, the lower ones producing from near their base long narrow branches. The leaves on my specimens are not imbricate, and their margins, although more or less scarious show no signs of having been white, and the bracts are not cuspidate.

STINK GRASS OF BRAZIL.

Mr. F. M. Bailey says:—Seeds of the grass now brought under notice were received from the Agent-General, London, as a species likely to prove a valuable addition to the drought-resisting species already indigenous in Queensland.

The only name attached to the seed was "stink grass" of Brazil, and the systematic name could not be fully ascertained until flowers were produced.

From a small quantity sown some few months ago, a good growth has been obtained, and the plants are now in full flower. The grass proves to be *Melinis minutiflora*, Beauv., and is figured in the Brazilian Flora under the name of *Panicum Melinis*, Trin.

The species has a vigorous habit, is very leafy, and likely to prove a good fodder grass, but as to its drought-resisting properties, and whether it will stand grazing, these have to be yet proved.

The height when in flower is about 4 or 5 feet, leafy to the inflorescence, and more or less clothed particularly at the joints with glandulose hairs, which probably suggested one of the names, *Tristegis glutinosa;* it possesses a somewhat peculiar odour, but not of such a disagreeable character as to account for the only vernacular name by which it seems to be known.

Apiculture.

GLASS OBSERVING SUPER.

By H. R. STEPHENS, Toowoomba.

I wish to call the attention of bee-keepers to a useful apiary appliance which I think is not generally known. It comes in handy for examining bees without the aid of a smoker, and when some information is required as to the strength of the colony without going to the trouble of lighting a smoker and lifting out frames. The observing super is a half-depth hive with a two-pane glass slide fitted into the top. The method of use is to peel the mat quickly and quietly off the tops of the frames and to immediately place the observing super on. Some of the fighting bees will buzz up against the glass for a few minutes, but will soon settle down with the others; and the inspection can then be carried out at leisure, and a fair idea formed of the requirements of the colony. In hives of new swarms, also, the observer would be handy, as it is necessary to see if the bees are settling down to work and drawing out the foundation satisfactorily, as the latter may sometimes fall out of the frames and cause crooked combs if not seen to; and the smoker need not be lighted when it is required to get an idea of the breed and quality of the bees, as they can be seen very well when on the top bars of the frames, the super being in place. It is usually on first opening a hive that bees attempt to sting, and the more so if there is any roughness in the operation, but, with an observing super, they have not time to come out, and generally quieten down in a few minutes; but if, in exceptional cases, they sometimes imitate De Wet and try to carry on a guerilla warfare, then get the smoker and push back the glass slide a bee-tight space, and fumigate them at pleasure; but such drastic measures are not often necessary, and are merely the exception that proves the rule.

BEES KILLED, FRUIT INJURED.

An experiment of spraying fruit trees while in bloom was tried, not for the purpose of finding out whether it killed the bees, but to determine whether spraying at such times was injurious to the pollen and its development, and in general to the setting of the fruit. The experiment was conducted from the standpoint of the fruitgrower, because it is universally conceded among all beekeepers who are in a position to know that spraying during the time of bloom destroys bees by the thousands. Sometimes whole apiaries are so decimated that but few colonies are left from which to make an increase after the spraying season is over. Many instances of this kind are on record. Now, we know positively that spraying during fruit bloom is detrimental to both bee life and to the fruitgrower, and as soon as fruitgrowers themselves discover that they are losing money the practice will be discontinued. It is now in order to educate the fruitgrowers that I call their attention to the facts.—A. I. Root, in "Gleanings in Bee Culture."

Horticulture.

ROSES.

At the monthly meeting of the Horticultural Society, held on 4th May last, the interest of the members present was centred in a discussion on the twelve best roses. A circular had been sent round to the members and one or two outside who are specially interested in roses, asking them to return a list of the twelve roses they considered best to grow in the neighbourhood of Brisbane, combining, first, vigour of growth; second, freedom of bloom; third, general usefulness for exhibition, garden, and decorative purposes. Twenty-eight requests for lists had been sent out, and twenty-five responses were received. The analyses of these gave a return which will be of great interest to many who will read this report. First, as receiving the majority of votes, came the now well-known rose, still comparatively a new one, Maman Cochet, which received 21 votes, having been left out of only four lists; Niphetos, including the climbing variety, specially mentioned as such by 14, received 19 votes; Marechal Neil and Souvenir de la Theresa Levet, 18 each; Marie van Houtte, 16; Kaiserin A. Victoria, Malmaison, and white Maman Cochet, 12 each; Earl of Dufferin and Perle des Jardins, 10 each; La France, 9; and Reine Marie Henriette, 8. The last received one vote in three. In the vote for Kaiserin, two lists specified the climbing variety, for Malmaison seven mentioned the climber, five did the same for Perle des Jardins, and two with La France. The above, therefore, are considered the best twelve. Following in order, six votes each were given for Prince Camille de Rohan, Madame Lambard, and the Bride, five each for Medea, A. K. Williams, and Madame Hippolyte, Jamain, and four each for Sunset, Lord Tarquin, Delice de Plantier, Madame de Watteville, and Lamarque. This might be made a foundation for a second twelve, by persons interested choosing the rose required to make up from one of the following which received three votes each: Duchesse d'Auerstadt (climber), Francisca Kruger, Catherine Mermet, Souvenir de President Carnot, Souvenir de Madame Joseph Metral (climber), Perle de Lyon, Homer, and Etoile de Lyon, otherwise called Madame Caro. Two votes each were given for Celine Forrestier, W. A. Richardson, Archduchesse M Immaculata, Madame Georges Bouland, Triomphe de Pernet Pere, and Mrs. J. W. Grant, otherwise Belle Seebricht. Forty-six roses received one vote each.

Much interest was taken in the discussion which followed. The merits and demerits of several varieties received attention, some members praising the new variety, Bessie Brown, stating they had not yet grown it long enough to feel justified in including it in their lists. It was decided to have a similar discussion at some future meeting, when the question of the best twelve tea roses, six hybrid perpetual roses, and six hybrid tea roses could be taken up.

AMERICAN ROSES.

The *Gardeners' Chronicle* of 5th January refers to a statement made in a daily paper of 2nd January concerning some American-grown roses. It says:—"Perhaps the most pleasing gift that came to the Queen at Christmas, among the myriad tokens of love from all parts of the world, was the box of magnificent Queen of Edgely roses from Philadelphia. The roses were a feature of the decorations at Osborne, and they are still bright and fresh, though more than a week has passed since the 'Lucania' brought them to Liverpool, as was then

related by the *Express*. It took no less than two years to produce the twelve magnificent roses presented to the Queen on the last Christmas of the century. Two years ago, when the British Horticultural Society held an exhibition of roses at Buckingham Palace, Her Majesty graciously asked Mr. David Fuerstenberg, a veteran rosegrower of Philadelphia, what he, an American, thought of the English roses. He replied that they were very pretty, but that everyone grew better roses in the State. He pointed out that the flowers were small and the stems short, whereas in America great roses were shown with yard-long stems. Her Majesty expressed a preference for fragrance and delicate loveliness rather than for size and length of stem, but said that she would like to see the gorgeous American roses. The American, on his return home, began experimenting in order to produce the finest roses ever grown, and also to discover a method of preservation certain, at least, for twelve days. After twenty-four months he accomplished both ends, and sent the dozen promised roses in charge of a famous London florist on the 'Lucania.' The roses are superb, being 8 inches in diameter, and having stems a yard long. The large blooms are shaped like the American Beauty, but are a bright pink colour. The precious flowers arrived in perfect condition. The ends of the stems were placed in long glass phials, filled with water and capped by rubber fitted closely around the stem. The opened buds were then wrapped up in waxed paper to exclude the air, and then the roses, stems and all, were buried, each by itself, in soft moss damped and packed in cracked ice. The box of roses was then sealed in a strong box and placed in the 'Lucania's' cold storage room. When the box was opened it was found that the buds had burst into full bloom, and were entrancingly fragrant and beautiful. They were consigned to the Secretary for Foreign Affairs, who saw that they were safely delivered to Her Majesty. Thus it was that the loveliest and largest roses in the world came to the Queen (and to the *Gardeners' Chronicle*) at Christmas." The *Chronicle* did receive a box of roses at Christmas from Philadelphia, but all the petals fell away when unpacked.

HOW TO PACK FLOWERS FOR POST.

So many of our friends on the Downs send boxes of beautiful flowers to Brisbane during the season when the most beautiful and exquisitely scented European flowers are in bloom, that we should wish them to study the art of packing them for the journey so that they may arrive in good condition. Many a box have we seen full of violets crushed and partly destroyed by the final watering considered essential before closing the parcel. If blooms are packed into a box carelessly, with a cabbage leaf beneath and above them, and then dowsed with water with the idea of keeping them fresh, by the time they arrive at their destination, after the rough handling they usually receive in the guard's van, the greater part are destroyed, and the remainder look like the Last Rose of Summer—faded and gone. Flower-packing is an art well understood by florists. Look at the exquisite blooms in some of the Brisbane florists' windows. Many of them have stood a journey from Sydney and even from Melbourne, yet they look as fresh and delicate as if still growing on the plant.

The best travelling box is one made of tin, but strong cardboard boxes will do on emergency. Line the box with white paper. Cut the flowers early in the morning—never in the afternoon. Lay them in the box one by one, filling up the whole space; if they do not fit into the corners, stuff the latter with soft tissue paper. Do not sprinkle any water on them, but cover with a few fern leaves, and over these place a sheet of damp cotton wool. The flowers will travel safely, provided the train and postal officials are careful. If they are not so, it will probably be your own fault. To avoid accidents, label the box in clear, large letters "Cut Flowers." The recipient of flowers thus packed will find no damaged ones in the parcel.

ON THE CULTIVATION OF INDIGENOUS PLANTS.

(Read before the Queensland Horticultural Society.)

By The Hon. A. NORTON, M.L.C.

The good people of Manly, near Sydney, some years ago conceived the happy idea of holding a show of native flowers; the suggestion was readily taken up by those who lived at this pleasant seaside resort, and eventuated in what has been described as a most successful exhibition. The popularity of this first effort led to an annual show, and each year the collection of native plants was larger and the arrangement more attractive, and many hundreds of visitors crowded the ferries from Sydney in order that they might be present at so novel an entertainment. Notwithstanding their success, however, these shows of native flowers led to much mischief, for, in their anxiety to secure specimens, ruthless collectors broke down the branches without regard to consequences, and, for many miles around, thousands of beautiful plants were destroyed. At Brisbane we have not attempted to get up a show of native flowers; all that has been done in that direction so far is the offering of a prize for the best collection of native flowers exhibited by children at our horticultural exhibitions; and the result has been worse than failure. Generally the miserable exhibits sent in are unworthy of acceptance, and certainly ought not to be awarded a prize; they teach nothing of the beauty and variety of the flora of the country, and the collections submitted for competition generally are assisted by the presence of lantana, adjuratum, or some other introduced plants which have no practical value. And yet we have many beautiful trees and flowering plants in Queensland; many, indeed, within a moderate distance of the metropolis, which are worthy of a place in any garden; not a few of these are found in public and private gardens, but some which are strikingly beautiful are much too poorly represented. As an instance of this I might mention the flowering tree, *Lagunaria Patersoni*, of which there is one only, I believe, in our Botanical Gardens. It is one of the hibiscus family, and belongs to the natural order *Malvaceæ*. The individual tree referred to is about 25 feet or perhaps more in height, and in summer time every branch is covered with beautiful pink flowers. It is one of the ornamental trees I well remember as growing in my father's garden near Sydney when I was a boy. Afterwards I saw it in its full beauty in the scrubs on the banks of the Clarence River; then in similar scrubs in Queensland. That these trees grow readily far away from their natural home is proved by the fact that dozens of them help to adorn the beautiful reserves around Adelaide in happy companionship with other Queensland trees. The one specimen I have referred to is the only one I have seen in cultivation here, but in Adelaide they are properly appreciated.

I desire, however, to specially call attention to the fact that many of our most beautiful native trees and smaller plants can be and are most successfully grown when removed to and cared for in cultivated ground. Surely at a horticultural show a collection of flowers from these would be more attractive than the scratch collection of native and introduced weeds which we now give a prize for. By directing attention to them, too, their more general cultivation would be encouraged, and visitors from other countries would have an opportunity of seeing something of them without going out into the country for that purpose. Amongst other well-known native ornamental trees in our Brisbane gardens I might mention *Stenocarpus sinuatus*, sometimes known as tulip-tree; *Barklya syringifolia*, which before Christmas time is loaded with golden bloom; *Castanospermum australe*, more commonly known as Moreton Bay chestnut or bean-tree; *Grevillea robusta*, the silky oak; the crimson bell-flowered *Sterculia*, commonly called flame-tree. To these may be added numerous others—cassias, acacias, hibiscus, &c. *Hibiscus rhodopetalus* grows readily in my own garden In its natural state I had not seen this plant south of the Burnett River until a few years ago I found a large patch in fine bloom a few miles out of Gympie. On

a large silky oak which grows at what used to be known as Pettigrew's Sawmills, in William street, there is a splendid specimen of *Millettia megaspermum*, sometimes called the native *Wistaria*. This climber has made its way to within a short distance of the top of the silky oak, and in the spring time it is loaded with masses of beautiful bloom. Amongst the native climbers, *Bignonia jasmenoides*, the Moreton Bay *Bignonia*, which is common on our river banks and is grown in some gardens, deserves a first place; it may be cultivated without trouble, and gives a ample return for whatever attention it receives. Almost, if not altogether, unknown in Brisbane is the beautiful *Passiflora aurantia*, which is abundant in the Burnett and other coast scrubs; its flowers, when they open, are cream coloured, but they gradually change to a bright red before they fade, so that on one vine there may be flowers of every shade from cream to bright red at the same time. This climber grows also in New Caledonia, and was formerly described under the name *Disemma*. I have seen this plant blooming freely in my brother's garden at Sydney, where it was raised from seeds collected by myself in the Burnett district. *Barklya* grows and blooms in the same garden, having been raised from seed collected by myself in the Port Curtis district; but more striking than any other is a lovely bush of *Cassia Brewsteri*, the seed of which I obtained on the Dawson River. This specimen is better grown and in every respect finer than any I have seen growing wild. Another climber of great beauty I cannot pass without notice, although it may be found in many Brisbane bush-houses. I refer to the *Hoya australis*, which grows not less freely in a bush-house than in the scrubs where it is commonly found. In my experience it will grow wildly if left to itself and watered often enough to keep the soil moist, and a specimen in my bush-house is loaded in the early summer with hundreds of trusses of bloom. I might mention scores of other blooming plants, such, for instance, as the *Ipomœas*, which are well worthy of recognition as garden plants, but I have no desire to become tedious. I will only refer to two or three others which I have obtained from the wilderness, and which have thrived admirably as pot plants. Two of these I brought in from a place near Gympie which I rented a few years ago. *Eurycles Cunninghami* is found in abundance growing along the edge of vine scrubs; at one time many of these bulbs grew besides the creeks near Enoggera. Their bright green leaves and pure white bunches of flowers are very suitable for the bush-house, or for house decoration. Not less beautiful is *Calanthe veratrifolia*, of which I have found hundreds of specimens growing under the shelter of vine scrubs. I have seen over a hundred flower stems in bloom within quite a small patch of ground, and the effect of their pure white flowers is then most striking. They grow very readily as pot plants, or in protected places in the borders. The bulbs of *Eurycles amboinensis* I obtained from North Queensland, where they are called Christmas lily. They grow very readily in shady places, and when flowering are not unlike the white agapanthus. One only other specimen I will refer to: This was given to me by our highly respected Colonial Botanist, Mr. F. M. Bailey, who brought it from the far North. The plant I refer to is *Curcuma australasica*, and in my garden it grows and flowers freely in the open borders. It is closely related to the gingers, and throws up a flower stem from the centre of the leaves with a large number of pink and yellow flowers, each sheltered by a green sheath, the whole forming a handsome cone as large as a medium-sized pineapple. This plant is most suitable, if grown in a pot, for household ornamentation.

My object in naming so many of our native plants is to remind non-professional gardeners how readily plants from all parts of the State succeed in cultivation. In the Sydney Botanical Gardens, plots are reserved for the cultivation of native plants, and they are there botanically arranged for the instruction of students of botany. I do not wish, however, to advocate in this paper their cultivation scientifically so much as to point out that large numbers of our own choicest plants are worthy of an honoured place in any good garden, and that the objects of our Horticultural Society would be more largely promoted by encouraging their cultivation than

by offering any number of prizes for such collections as have so far been exhibited. Nothing can be learnt by collecting and exhibiting those common native flowers which grow about Brisbane, and which have practically no value for ornament or use, and even the taste for flowers is not cultivated by gathering them. I would suggest, therefore, that the cultivation of ornamental indigenous plants be encouraged by offering prizes for the best exhibits of those, whether they be obtained from their native haunts or from gardens. The adoption of this suggestion would also help to teach those who care to learn which plants are indigenous and which introduced. That a little more knowledge in this direction is desirable will probably be generally admitted, but I will refer to one instance which tends to prove that such knowledge is of more than passing value. A few years ago some finely carved panels of cedar were sent to the mother country for use in the Queensland division in the Imperial Institute. My attention was directed to them by a paragraph in the *Courier*, which stated that they might be seen at the Works Office, and that the plants and flowers had been specially selected to illustrate the Queensland indigenous flora. When I visited the office I had to ask what botanical authority was responsible for the selection. Mr. Bailey was sent for, and it was probably quite a surprise to the authorities to learn that sunflowers and other introduced garden plants are not indigenous in Queensland.

A GIGANTIC SUNFLOWER.

An enormous Russian sunflower has been grown at Manly by Mr. J. A. Beal, of the Lands Department. The plant only bore one flower, which was 14 inches in diameter when cut. It is not often that such large flowers are seen, although we believe that in England specimens of Sutton's giant sunflower have attained a diameter of 16 inches, the plants being 10 feet in height.

KEEPING FLIES OUT OF HOUSES.

A remarkable method of preventing flies entering a room was many years ago communicated by an experimenter, a well-known entomologist, to the Transactions of the Entomological Society in London. The open windows were covered with a net made of white thread, with meshes an inch or more in diameter. Now, there was no physical obstacle whatever to the entrance of the flies, every separate mesh being large enough to admit, not only one fly, but several, even with expanded wings, to pass through at the same moment; consequently, both as to the free admission of air and of the flies, there was practically no greater impediment than if the windows were entirely open, the flies being excluded simply from some dread of venturing across the network. The only condition is, that the light enter the room on one side only, for if there be a thorough light from an opposite window, the flies will pass *through the net.* It is a remarkable thing that Herodotus (Book II., chapter 95) records that the fishermen in his time protected themselves from mosquitoes, when asleep, by covering themselves with their casting-nets, through the meshes of which the mosquitoes would not pass. We fear that the Australian mosquito would care very little for this kind of mosquito net, seeing that they will crawl through a very small hole accidentally made in a curtain. It may be, in the case of the flies, that they take the net for a spider's web, and so avoid it.

Tropical Industries.

THE WORLD'S SUGAR PRODUCTION.

Mr. Licht, the German sugar statistician, reported the total beet sugar production for the year 1899-1900, ending 1st September, 1900, at 5,523,000 tons, an increase of 277,000 tons over the previous year. For the current statistical year, which does not end until the 1st September, 1901, Mr. Licht has made the following estimate:—

BEETROOT-SUGAR CROP.	Estimate. 1900-1901. Tons.
Germany ...	1,950,000
Austria-Hungary ...	1,075,000
France ...	1,125,000
Russia ...	890,000
Belgium ...	340,000
Holland ...	170,000
Other countries ...	400,000
Total beetroot ...	5,950,000
CANE-SUGAR CROP.	
Java ...	670,000
Cuba ...	500,000
Louisiana, &c. ...	340,000
Hawaiian Islands ...	320,000
Mauritius ...	160,000
Brazil ...	150,000
Peru ...	10,000
Demerara ...	90,000
Egypt ...	85,000
Antilles ...	85,000
Porto Rico ...	70,000
Philippine Islands ...	50,000
Trinidad ...	45,000
Barbados ...	40,000
Jamaica ...	30,000
Martinique ...	30,000
Guadeloupe ...	30,000
Réunion ...	30,000
Total cane sugar ...	2,850,000
Grand total ...	8,800,000

As against this estimated production of 8,800,000 tons of sugar of all kinds there will be a probable consumption of, say, 8,500,000 tons, as against 8,200,000 tons the year before. If the consumption be no greater than this, and if the estimate of the total production be accurate, there would be an increase of some 300,000 tons in the stock on hand 1st September, increasing it to 900,000 tons as against 600,000 tons last September.

Messrs. Willett and Gray, the New York sugar statisticians, estimate the beet sugar production for the year 1900-1901 at 6,077,000, including the American beet sugar crop, as against about 6,000,000 given above by Mr. Licht. Messrs. Willett and Gray estimate the cane-sugar crop of 1900-1901

at 3,440,000 tons against Mr. Licht's estimate of 2,850,000 tons, a difference between these prominent statisticians of 590,000 tons. Messrs. Willett and Gray estimate above the figures of Mr. Licht about as follows:—

	Tons.		Tons.
Java	40,000	Porto Rico...	15,000
Cuba	100,000	Trinidad	5,000
Mauritius	30,000	Barbados	30,000
Brazil	28,000	Martinique	5,000
Demerara	15,000	Guadeloupe	5,000
Egypt	29,000	Réunion	5,000

Mr. Licht does not consider Mexico, estimated at 93,000 tons by Messrs. Willett and Gray, nor Argentina, estimated by them also at 70,000 tons.

[Mr. Licht appears also to have ignored the sugar production of Queensland and New South Wales in his estimate of the cane sugar crop of the world. The former State produced in 1900, 92,554; whilst New South Wales in 1899 (figures for 1900 not yet available), 15,352 tons.—Ed. *Q. A. J.*]

On the other hand, Messrs. Willett and Gray make lesser estimates as follows:—

	Tons.		Tons.
Louisiana	70,000	Peru	15,000
Hawaii	8,000	Philippines ...	20,000

Anyway, it is apparent that the sugar supply will be quite large, but as the demand is constantly increasing it is fair to infer that there will be no serious accumulation in the markets of the world.

CASSAVA.

We have had many inquiries since we wrote on the cultivation of cassava as to its commercial value, and with reference to the method of cultivation. Cassava is sometimes called Brazilian arrowroot. It resembles arrowroot in one respect, so far as manufacture is concerned, in that tubers are rasped, and the starch precipitated as in the case of arrowroot. There are two species of the plant (which is one of the Euphorbiaciæ)—viz., the Bitter Cassava, *Manihot utilissima*, and the sweet, *M. Aipi*. Both furnish highly nutritious food starches. The bitter contains a poisonous element, hydrocyanic acid (prussic acid), and, as a consequence, cannot be eaten in a fresh state, whilst the sweet variety may be used as a table vegetable without any preparation. The poison of the bitter variety is, however, rendered volatile by heat, after the application of which the juice may be safely used as the basis of cassareep and other sauces. In Brazil great use is made of the bitter cassava. The dried roots are rasped, and a kind of flour results, from which cassava cakes are made.

The plant is easily cultivated and finds a congenial home in Queensland, When the land intended for cassava is well broken up and reduced to a good tilth, the rows are laid off much in the same manner as for sugar-cane, but only 4 feet apart. The sets consist of portion of the stalk cut into pieces about 6 inches long. Four inches is a better length, because the roots springing from the cut ends are those which produce the tubers. Like all other such crops, they must be kept clean. There is no need for deep cultivation, indeed, shallow work is the best. A very fair profit may be made by growing cassava, as is shown by the *Florida Agriculturist*. That journal, quoting from the *Leesburg Commercial*, says—

While there is no great big money in growing cassava, there can be a reasonable profit made in growing it, and it is not subject to be killed out by the frost like some crops, for it is planted after the first frosts are over, and matures before the frost comes again.

The following information on this important subject is furnished us by Mr. George E. Pybus, of Fruitland Park, who has been growing cassava for several years. He estimates the cost of growing cassava as follows:—

	Per Acre. $		s.	d.
Ploughing	1·50	=	6	0
Harrowing	0·35	=	1	5½
Seed, planted 4 x 4, 2,700 hills, 6-inch pieces, 1,500 feet, at 12½ cents ...	1·70	=	6	11
Planting	1·07	=	4	0
Six cultivations at 35 cents	2·10	=	8	5
Four hoeings at 1 dollar	4·00	=	16	0
Fertiliser, 350 lb. at 23 dollars per ton ...	4·00	=	16	0
	14·65	=	58	8½
Digging and hauling, say 1 mile... ...	1·25	=	5	0
Value, f.o.b.	5·00	=	20	0
Net	3·75	=	15	1½
Necessary to make, say, 4 tons to pay expenses	14·00			

Leaving a net profit of 3·75 dollars per ton on all above 4 tons. Of course, two of the above items, cultivating and hoeing, may vary, but to make a success of the crop, it must be kept clean until it can take care of itself, and he believes his estimate to be a fair one. Notwithstanding the ill-luck which attended all who adopted fall planting in 1899, he has just finished planting 10 acres, being determined to give cassava-growing as a farm crop a fair trial.

The resulting crops with good fertilisers will amount to from 6 to 8 tons per acre, and the digging can be done for about 2s. per ton. The cost of hauling will, of course, depend on the distance. On sandy soil it will yield more feed than any other crop that can be grown. For feeding pigs, horses, cows, and chickens no better crop can be grown. It will produce the best of pork and bacon; it will make excellent pastry and delicious breakfast cakes.

ORGANISING THE SUGAR INDUSTRY.

The work of organising the Queensland sugar industry, remarks the *Mackay Sugar Journal*, is being pushed forward with some vigour, and is likely to eventuate in a strong association being formed, very much on the lines laid down by us last month, which lines were similar to those advocated by the sugar conference held fifteen months ago in Mackay. It now rests for the growers and manufacturers in the various sugar districts to complete the formation of, or strengthen the already existing associations or unions, in order that each district may be thoroughly in touch with the central body, which we hope is destined to effectively represent the whole industry in all matters where a general consensus of opinion is to be expressed. No time should be lost, and delegates with plenary powers should at once be elected to attend the conference which will take place in Bundaberg in the early part of next month. If this conference is well attended, not by persons acting on behalf of distant associations, but by actual delegates from those bodies, then a really sound commencement will have been made to draw the sugar people together, and establish an organisation by means of which Dr. Maxwell's splendid services will be placed at the disposal of every cane farmer in the State.

There is, of course, much to be done before the organisation can become a living and active factor in promoting the welfare of our industry, but no time is to be lost, otherwise the years, as in the past, may be allowed to slip by with nothing being done. Dr. Maxwell's engagement with the Queensland Government is only for five years, and at least one of the five years will have passed

before the association will be in actual operation. Nothing can illustrate the necessity of the organisation better than the difficulty which must be experienced by Dr. Maxwell in making the report upon the sugar industry which he has undertaken to supply Mr. Barton, the Commonwealth Prime Minister. The information required to make that report complete should really be gathered by an organised body, for the thousand and one details necessary to a full and comprehensive grasp of the whole question are not easily obtainable by any single individual. It cannot be expected that Dr. Maxwell will go from district to district, and from farm to farm, collecting all the minute facts that go to make up the whole of the information dealing with the industry, and by so much must the task he has undertaken be the more difficult. At the same time, even after the report has been made there are still all the facts required to enable the work of the sugar experiment stations to be carried out along lines which will do the greatest amount of good. There is also the information on sugar matters, the result of experiments, and the particular problems awaiting solution which must be known both to Dr. Maxwell and to the cane-growers and sugar manufacturers. We believe it is safe to say that every intelligent man connected with the sugar industry has considerable, if not unbounded, faith in Dr. Maxwell and the work he is undertaking, but to make that work of value, to put a crown of effectiveness upon it, there is an absolute necessity for the sugar experiment stations, their organiser and his staff, to be brought into close and easy communication with the people spread up and down the scattered districts along our seaboard. It would be well if those engaged in the industry recognised this, and at once took active steps in the direction which has been indicated. We are well within the mark when we venture to assert that Dr. Maxwell himself is not too sanguine of success attending the work if the people do not back him up by forming the organisation which he has declared to be necessary. We shall await the results of the June conference with the keenest interest. Upon it will largely depend all further efforts to promote the establishment of a sugar association, embracing the whole State. In the election of officers to control that association the broadest-minded men we have should be chosen, while it should be recognised that reasonable representation must be given to each district in the general control of the executive of the body. That this will be done we have every hope, and, as stated above, it rests now with the manufacturers and farmers to do their share of the work in sending delegates to Bundaberg, not to talk only, but with power to act on behalf of their respective districts at the June conference.

BANANA FIBRE.

About a year ago we received a sample of banana fibre from the Cairns district. It struck us that it would be well to obtain a valuation of it from some firm in London engaged in the fibre trade. The sample was, therefore, sent to a gentleman in London, who now forwards a report upon it by Messrs. Henry Devitt and Co., Mincing lane, London.

The brokers say:—"We have carefully examined the sample of hemp from Queensland; it is Manila character, good strong fibre, but mixed lengths, some very short; value, about £25 per ton. We should, no doubt, be able to find an outlet, and would recommend a trial shipment."

The Manila hemp of commerce is derived from the plant known as *Musa textilis*, but all the plantains and bananas yield an excellent fibre, especially *Musa paradisiaca*. Most people in Queensland know how easily bananas and plantains grow in this State. They are found in vast quantities in the Northern scrubs. These wild bananas produce a small fruit full of seeds. When cultivated, the seeds eventually disappear. Bananas require very little care, and on the rich coast lands throw up an abundance of stalks from the rhizomes.

The height of *Musa textilis* varies from 12 to 30 feet, and at three years of age it begins to flower. As soon as the flower is out, the plant is cut down and the sheathing stalks are torn into strips, the outside sheaths being kept distinct from the inner ones. The outside ones produce a strong fibre of great durability and strain-resisting power. This fibre is used for cordage. The inner fibre is fine and weak, and is used by the natives for weaving fine, almost transparent, yet fairly strong dress material. A Manila native merely cuts down the plant, shreds it, and then scrapes off the soft cellular matter, after which he hangs it up to dry, and no further treatment is necessary. He can produce 25 lb. weight of fibre per day in his lazy fashion, each stalk yielding 1 lb. of fibre. By the employment of suitable machinery the work of cleaning the fibre is very rapidly performed.

Six hundred thousand seven hundred and thirty-eight bales of hemp were exported from the Philippine Islands in 1899, equal to 1,201,476 piculs, or 71,337 tons. At the price quoted by our correspondent—£25 per ton—this represents a value of £1,813, 425. There seems no reason why Queensland should not capture some of this trade.

COFFEE IN BRAZIL.

A Brazilian journal, the *Boletim da Agricultura* of Sao Paulo, furnishes some interesting statistics relating to six municipal coffee-growing districts of the Republic.

From these, it appears that there are in those districts 466 plantations, having an aggregate area under coffee of 56,414 acres, carrying 22,944,188 trees, of which 15,116,188 are four years old and upward, and 7,828,000 trees under four years. The hands employed number 13,919, being 4,748 less than are actually required. During harvest time, 10,034 extra hands are engaged.

The Brazilian coffee crop for the year 1901 is estimated at 9,500,000 bags.

On analysing the figures given in the *Boletim*, *Planting Opinion* says:—

From this it would appear that one hand can care and work about 1,300 trees, of which 1,000 are in full bearing and the rest under four years, and that one extra hand is required per 1,500 trees in full bearing at harvest time. Supposing that all these hands employed were male adults earning, say, 2$500 (1 dollar = 1s. 8d.) per day or 70$000 per month, including keep, the cost of labour would be 11,69*x*,960$ for maintenance, and 2,107,140$ for harvest, in all say 13,800,000$. At an average of 80 *arrobas* (1 *arroba* = 33 lb.) per 1,000 full-bearing trees, the aggregate yield would be 1,209,288 *arrobas* of 15 kilos, and the cost of labour work out at 11$400 per *arroba*. Evidently there must be a mistake somewhere, as, with coffee selling at 9$000, it is quite impossible that labour should cost 11$000 per *arroba* or anything like it. The mistake must be either in the number of hands employed or in the estimated number of trees.

COFFEE IN QUEENSLAND.

Commenting on the last report of Mr. H. Newport, Instructor in Coffee Culture, on the state of the coffee industry in this State, *Planting Opinion* says:—

In Queensland, coffee-growers—of whom Mr. Newport reports some 200 altogether, cultivating from 1 to 75 or 80 acres (the biggest estates) or in all 700 acres—are so far more fortunate. They sell all their coffee for local consumption, and get 56s. per cwt. for it in parchment or 112s. per cwt. clean according to sample. With such a difference, it ought to pay to run a pulper and drying-ground in some of the districts. The oldest coffee is not more than six years old, and the Indian planter who is now coffee inspector for the

Government is sanguine enough to speak of 10 cwt. an acre *without manure* and a total crop worth £20,000 to £30,000. This would mean £30 to £40 gross return per acre—rather a contrast to, say, £4 in Coorg and £4 to £5 in Selangor! And, moreover, Mr. Newport tells us that a good deal of the coffee is Liberian, though chiefly *C. arabica*. However, we must remember that it is principally garden cultivation in Queensland, and the soil and climate must be splendidly adapted to coffee when we are told:—

On the whole, the condition of the estates as I found them was not encouraging—in some cases the weeds were over the coffee. Where the coffee had been kept clean, the growth and bearing were remarkable. For amount of crop the Buderim Mountain is noticeable, the quality being also specially good here. On the Daintree River one or two estates that had been kept assiduously free from extraneous growth showed remarkable development, trees of thirteen and fifteen months being topped at 4 feet, having a good spread of secondary growth, and spiking heavily, showing promise of a 5 to 6 cwt. crop that would ripen when the trees were not more than two and a-half years old. For all-round good qualities, some of the properties in the vicinity of Cairns, especially on the range about Kuranda, are pre-eminent.

Of course labour is the difficulty. A Ceylon planter with fifty, nay twenty, good coolies might quickly make his way to fortune; but would he be allowed to import even one coolie to work on the land is a question not likely to be answered in the affirmative from Queensland.

Finally, we are surprised to learn of the great progress made with Liberian coffee (such a complete failure as it was in Ceylon) in Java where, for 1901, Liberian is expected to contribute 131,000 piculs against 106,000 in 1900, and this out of a total coffee crop (Government, private, and Liberian) of only 383,000 piculs as against 542,000 piculs in 1900. So that in Java also coffee is going back as a whole, though the Liberian kind is apparently keeping up. But then all that the Eastern and Austral world can produce of coffee is but as a very little in comparison with the great and ever-increasing coffee crops of Brazil, Central America, and Mexico.

LAST SEASON'S COTTON IN THE UNITED STATES.

As the result of articles on the cotton industry which have appeared in this *Journal* (February, 1901, p. 116, and May, p. 375), we have received several inquiries as to the cultivation, price of lint and seed, markets, &c. It is possible, we learn, that some farmers may plant an acre or two as an experiment. A bale of cotton was lately sent from New Guinea to Liverpool, and although it was of a poor variety, badly got up and discoloured, it sold at a very fair price, covering, we are informed, more than the total cost of production, freight, &c. If this be so, then, although black labour would not be utilised by Southern and Central Queenslanders at least, as is done in New Guinea, cotton grown from the best variety of seed, free from stain and well got up, should stand a good show in the home market. Much of the American cotton is now used in local cotton-mills, much goes to Japan, so that Europe has to look to other countries to make up its requirements.

Judging from what the *Florida Agriculturist* says of the price locally obtained for Florida cotton, there should certainly be little inducement to send it all the way to Japan and sell at 5½d. per lb.

Manager W. G. Robinson, of the cotton department of H. F. Dutton and Co., the most extensive cotton merchants in this State (Florida), has furnished the reporter with some interesting information in the matter of acreage and production of the cotton crop last season, which will likely prove valuable to our readers.

In answer to the question as to the aggregate production last season, Manager Robinson stated that in Alachua county 4,500 bales were produced, with an average of 390 lb. to the bale, or a total of 1,759,500 lb., with an acreage of about 18,000 acres. The product sold on an average through the season at 21 1-2 (10¾d.) to 22 (11d.) cents per lb., which means that the cotton crop realised a sum that would reach into the neighbourhood of 387,090 dollars (£80,600). Inasmuch as the product was sold almost exclusively at home, the growers received the benefit of this money; subsequently the merchants and commercial field generally reaped a proportion of the benefits.

THE PHYSIOLOGY OF SUGAR-GROWING.

By JAMES PINK.

The prospective crisis in the supply of labour for the sugar plantations naturally gives vitality to the question, Cannot some other system of cultivation be brought into practice whereby cane can be grown under less exhausting conditions to labourers in the canefields? I maintain that this can be done, for the present system of culture is founded on the old adage "all things come from the soil." In this case it is a misleading idea. The ash left in the furnaces after the mégasse has been burnt is the only part taken from the soil by the growing plant. The sugar extracted from the cane is composed of the gases carbon, hydrogen, and oxygen, and these are assimilated from the atmosphere, partly by the rootlets, but principally by the leaves. Therefore, under the present system of culture, the plants do not give the best results, and this is proved by the fact that cane grown in the experimental grounds always gives better returns than the same cane when planted out in the fields. Hitherto all the improved varieties of sugar-cane introduced here have, under our crude methods of culture, degenerated in a year or two to the average standard. The Creole cane came to Queensland with a great name; the first two crops grown at St. Helena gave 23 per cent. of sugar. To-day it is considered a third-rate variety, and the same can be said of other varieties. Taking all this into consideration, what conclusion is it possible to arrive at except that our system of culture is at fault? Our present system is to grow as many tons of cane per acre as possible. The canes are planted so thickly in the field that they lose their bottom leaves too quickly, leaving just a tuft of leaves at the top of the cane to collect from the atmosphere the gases to be converted into sugar. Consequently the cane returns only a minimum instead of a maximum of saccharine matter, and therein lies just the difference between a good and a bad system of culture.

The problem is, What other method is likely to produce the desired end? It is first necessary to consider how the cane obtains the constituents to be converted into sugar. According to Peligot's analysis, cane sugar is composed of—

Carbon	42·1
Hydrogen	6·4
Oxygen	51·5
	100·0

all elements of the atmosphere. How they are extracted from the atmosphere is described by Liebig as follows:—"The power of absorbing nutriment from the atmosphere with which the leaves of plants are endowed being proportionate to the extent of their surface, every increase in the size and number of these parts is necessarily attended by an increase of nutritive power, and a consequent further development. The functions of the leaves are to absorb nutritive matter from the atmosphere, and with the aid of light and moisture to appropriate their elements. These processes are continually in operation; they commence with the first formation of the leaves, and do not cease with their perfect development, but the new products arising from the continued assimilations are no longer employed by the perfect leaves in their

own increase; they serve for the formation of woody fibre and all the solid matter of similar composition. The leaves now produce sugar, amylin or starch, and acids."

As soon as the cane is fully developed, the nourishment obtained by the organs of assimilation from the atmosphere is converted by the leaves into sugar and sent down into the cane for its future development. At this period in the growth of the cane, every green leaf is of especial value, as it constitutes both a mouth and a stomach. Nature has given plants leaves not to merely decorate them, but they are a part of a wondrous system of life quite as perfect as that of the animal kingdom. Seeing, then, how indispensable are a healthy foliage and a free circulation of air about it, to enable the leaves to assimilate the elements of the atmosphere to be converted into sugar by the performance of the special functions destined by Nature to the leaves, therefore, to enable the cane plant to give a maximum return for a minimum of outlay, it is quite evident that a different system of culture from that in vogue at the present time will have to be adopted. It is difficult to promulgate a system that would be entirely satisfactory, but, instead of the present aim to produce as much cane as possible per acre irrespective of sugar, a more rational practice would be to select only the best varieties of cane and to plant and cultivate them in such a manner as to enable the plant to absorb and assimilate from the soil and atmosphere the elements, so bountifully supplied by Nature, to their fullest extent. By thus producing less cane and more saccharine matter, 5 to 10 per cent. more sugar per acre would be obtained than at present with less labour. What mode of planting would ultimately prove to be the best must be decided by practical experience; but, looking at the subject from a vegetable physiologist's point of view, the following method of planting and culture promises excellent results. Sets planted in treble rows thus:—

. 5ft. . 4ft. .

5 feet by 4 feet between the sets; the distance between the rows to be regulated by the variety of cane and by the fertility of the soil, but probably from 12 feet to 20 feet would enable the plants to develop strong and healthy foliage and the air to circulate freely among them. Every breeze that blew would convey the required nutriment to the growing plant, the air would pass freely between the rows, and the leaves would do their work by extracting from it the elements necessary to the full development of the plants. All the experiments in vegetable physiology carried out by scientific men, from Priestly to Saussure and Boussingault, must satisfy everyone that the leaves do assimilate carbon from the atmosphere in the form of carbonic acid. Boussingault found that by passing air over a vine branch in full leaf the leaves actually deprived the air of three-fourths of the whole quantity of carbonic acid it contained. As soon as the sun goes down the plants absorb carbonic acid from the atmosphere, and this goes on all night; but when the sun rises the plants commence to decompose the carbonic acid, exhaling the oxygen, and retaining the carbon, which, while the plant is growing, goes to build it up. But as soon as the plant has finished its growth, a change takes place; it no longer requires the carbon, which then combines with the other elements, and is converted into sugar by the leaves and sent down into the stem to be stored for the future use of the plant. The office of the cane is to convey fluid obtained by the roots from the soil, and called sap, into the leaves for elaboration and then to receive it back again. No matter how much sunshine may be let in on to the canes themselves, it gives them no power to produce sugar; they are only the medium between roots and leaves, and this goes on until the growth of the plant is complete for the season, after which the cane is used by the plant as a storehouse for the sugar.

Cane grown on the above lines would require no trashing, so far as the production of sugar is concerned; the wide spaces between the rows could be cultivated by horse labour during the entire season, thereby producing more sugar per acre with a minimum of labour.

AUSTRALIAN TOBACCO.

By R. S. NEVILLE,
Instructor in Tobacco Culture.

Why do manufacturers prefer American tobacco? Why is it the manufactured colonial tobacco does not makes as good a smoke as the American? These questions are often asked, and it may be said the last one in part answers the first, but is not a sufficient answer.

The following cable from London, dated 11th June, will throw much light on the subject, and emphasises what is to follow:—

"VICTORIAN TOBACCO.

"Sir Andrew Clark, Agent-General of Victoria, recently distributed among the leading importers and manufacturers at Liverpool samples of Victorian tobacco, and he has now received reports of an encouraging character regarding the quality of the article.

"One firm remarked that the Victorian tobacco, *if properly handled*, would be difficult to distinguish from Kentucky strips."

Strips is tobacco with two-thirds to three-quarters of the stem or midrib taken out.

This is the opinion of a class of men who are as fine judges of the tobacco suitable for their trade requirements as there are in the world. These men know what is required, and know the tobacco that will supply it, and you see their verdict on colonial tobacco.

"*If properly handled.*"

This involves the entire manipulation of the tobacco from the time it is harvested in the field until it passes into the hands of the manufacturer. How to do this has been shown in former articles in this *Journal*, under the headings "Directions for Curing Heavy Pipe and Export Tobaccos" and "Handling Heavy Pipe Tobacco."

The proper handling does not necessarily mean to take out the stem and make strips of it, for there is a large demand in the British market for unstemmed or leaf tobacco, as some forms of manufactured, notably certain kinds of Irish roll, take the entire stem, others simply butted—that is, the butt or projecting part of the stem is cut off; the stems are also used to some extent for making a low-grade smoking, and also for snuff. That the unstemmed tobacco is largely used is shown by the circular of Thomas H. Edwards and Co., Liverpool, of 30th April:—Of the 92,178 hogsheads and tierces in stock on that date, 18,460 were unstemmed or leaf tobacco. The Australian manufacturers use only strips for their American tobacco.

In addition to what has already been written on the proper handling, it is important that growers should be more careful in assorting and tying their tobacco. Some will cut suckers unmatured and that are totally unfit for use, and work them in; while in the United States this is never done, as buyers would refuse to buy it. It is unfair to manufacturers to demand payment for such stuff and expect them to throw it away, and when worked spoils the product. There has unquestionably been an improvement in the smoking qualities of the local product within the last two years, the result of continued effort on the part of the manufacturers to meet the demand of the trade for a good smoke, and to do this they have had to throw out the green and worthless sorts, and the growers are beginning to be more careful, and it is to be hoped they will continue, as the throwing out of worthless stuff is only a small loss to the individual farmer.

The green tobacco can be brightened and sweetened by hanging in the open air on scaffolds, and taking the dew, frost, and sun.

Coming now to the first question, why do manufacturers prefer the American :—

1st. Because it is a better tobacco, and they get better and more satisfactory results.

The reason it is better is because the American handles his tobacco properly and develops it, and gets the best results obtainable, and we can get the same or approximate results, for an analysis of the two tobaccos does not show any insuperable difficulties in the Queensland grown.

2nd. He gets exactly what he buys and does not find a lot of rubbish and undesirable tobacco mixed in with it that would destroy its value if put in their product. The American handler takes this out, and most likely puts it about his fruit trees where it will do most good. They also put the tobacco into wooden hogsheads, in weight from 700 lb. to 1,400 lb., where it retains its flavour, and the further changes enhances the quality. All of these things must come in time if the local industry is to become valuable and permanent. That every department of trade seeks excellence is probably more true of tobacco than most things, and it is therefore necessary for our growers to use their best efforts to get the best results. Shortly, the other States of the Commonwealth will be our competitors, and it will be a survival ot the fittest, and we should survive, and it rests with the grower whether we shall or not.

3rd. The tobacco received from the United States is in a more advanced stage towards manufacturing, and can be worked with less trouble and expense.

This should not discourage the Queensland growers. While the above is true, the margin of profit is sufficient to cover this, and in time, if the grower tries to advance, he will attain this also. We have here the testimony of good judges that Australian-grown tobacco can be brought to a degree of excellence equal to Kentucky, and this means painstaking effort.

RICE-GROWING IN THE LOGAN DISTRICT, AND ITS PREPARATION FOR MARKET.

By FRED. WM. PEEK, Loganholme.

INTRODUCTION AND EARLY CULTIVATION.

In writing up this article (by special request), I will endeavour to make the information contained as intelligible as possible to the ordinary farmer and agriculturist. Of the value of rice there can be no two expressions of opinion, as this cereal forms the chief food supply of over one-half of the entire human race, and certainly there is not another product or cereal that, commercially or economically, obtains the same value as rice.

The varieties of rice to be obtained from the various countries where rice forms one of the staple crops for food supply, are innumerable, running into several hundred varieties, particularly where it is grown largely, as in India, China, Japan, Siam, West Indies, and in other parts of the world, and it has been found that local names have been given to rice of the same variety and quality. For general purposes and distinction, rice has been classified into three distinct varieties or classes. These are known to us as the "Aus," or upland rice; the "Aman," or swamp rice; and the "Boro," another swamp rice, or a variety requiring inundation, warm climate, and rapid growth, and producing a large coarse grain, but which, so far as I have been able to ascertain, has not been tried or cultivated in Queensland up to the present. The portion of the Logan district where rice is now being extensively cultivated is known as Pimpama Island, which is situated in the south-eastern portion of this State, in 153 degrees east longitude and between 27 and 28 degrees south latitude, and is approached from Brisbane by means of the South Coast Railway as far as

Beenleigh, thence by well-formed roads for a distance of 12 miles crossing the Albert River and skirting round the base of Mount Stapylton or what is known locally as Yellowwood Mountain, which presents to the visitor's gaze one of the prettiest views in the Logan district, dotted from base to summit with its settlers' homes and splendidly laid out farms. The dark-green patches of sugar-cane, bananas, maize, and other crops, strongly contrasting with the rich red volcanic soil visible here and there, make a picture of agricultural industry both pleasing and effective, and one of which the district is justly proud.

What is known as "Pimpama Island" is the land lying between the Logan, Albert, and Pimpama Rivers, which are connected by a series of creeks and swamps with a long frontage to the Pacific Ocean or Moreton Bay, containing several thousand acres of rich coastal land, interspersed with large areas of ti-tree swamps, the water of which is brackish and undrinkable. The soil cultivated, and which has proved itself best adapted to the growth of rice, is of a sandy, loamy nature in appearance, but containing in a remarkable degree the constituents most suited to the nature and requirements of the plant, being easy of working, although slightly tenacious in wet or showery weather, but of very shallow depth in some places. Layers of decomposed marine shells are found in rather large quantities, pointing out that the lands were once ocean-washed, and the receding waters have left valuable deposits of lime and other constituents in the soil, which, together with the rich humus formed by the decaying foliage of scrub vines, palms, ferns, &c., of rank tropical growth, have left these patches of soil of varying area between the swamps most suitable for rice culture.

The value of the land averages from £2 10s. to £6 per acre without improvement, and very little, if any, remains unalienated, it being so close to Brisbane, and the Logan district being one of the first settled districts of the colony. All the best lands were early availed of for cultivation. Who first introduced the rice seed of commercial value to Queensland appears to be undecided; but our State Botanist, Mr. F. M. Bailey, has described a species of wild rice (*Oryza sativa*), a native plant of North Queensland, growing in the swampy lands there, as being indigenous to this State; also, the Chinese have grown rice rather extensively on the North Queensland river banks, particularly near Cairns, in patches for many years past, and which has met with a ready sale when placed on the market.

But it is to Mr. A. J. Boyd, the present editor of the *Queensland Agricultural Journal*, that the credit is due of the introduction, in 1869, of rice-growing in the Logan district—he having procured the seed and planted it as an experimental crop at his sugar plantation, Ormeau, which he then had at Pimpama. The seed was one of the Japan varieties, with which he met fair success as regards the growth and result. Since that time, from the seed Mr. Boyd raised and distributed, other settlers have taken up the matter of rice-growing at various times and in a fitful manner, the largest local planter some fifteen years ago being Claus Lahrs, an enterprising German settler, who planted at Pimpama Island two or three varieties of the China and Japan rices, but, owing to the seed not being tested or acclimatised, he met with but indifferent success. He even went so far as to incur the expense of erecting a mill for dressing the paddy (as rice in husk is termed), but after a few years he gave it up, partly because of the machinery, not being of the best description for dressing the rice, doing its work imperfectly, but also because the rice grown was not the best variety for table use or suitable for the home market. So the industry, so far as the manufacture was concerned, was allowed to lapse. The farmers since then have still kept on planting the rice, which they have cut and used for fodder for their horses and stock, using the seed saved from the crop reaped for re-sowing the land. The consequence has naturally been that the crop had deteriorated with successive plantings, through the same seed being used without change. But three things of great importance had been learned. These were: 1st. The suitability of the

Plate IV.

RICE COUNTRY.

soil and climate of the Logan district for rice culture. 2nd. The proper time at which to sow the seed to ensure success. 3rd. The best system of planting and after-treatment of the crop. The value of rice has also been thoroughly tested as green feed for horses and stock, who eat it greedily and keep in splendid condition when fed upon it. The greatest difficulty in rice culture has been found in procuring the right seed, there being such a large variety of each kind, both with their distinctive flavour, colour, and quality, as well as in the facility with which the crop can be handled and harvested (as I will explain further on) and in the requirements of the merchant, who has his prejudices in favour of certain kinds, which more or less best suit the tastes of the consumer. This has now to a certain extent been overcome, and our farmers are now prepared to carry out this important branch of agricultural industry on sound business lines and with up-to-date methods.

PREPARING THE LAND.

Rice, like every other cereal and vegetable, to ensure good results, must have a certain amount of attention and care in preparing the land, although the question of drainage does not enter so largely into consideration as regards rice as with other cereals, and it, of course, greatly depends as to which variety of rice you intend to cultivate, but stagnant water should be avoided as detrimental. The variety I intend this article to illustrate is the "Aus," or upland rice. I have tried the "Aman" variety as an experiment, but with small success, the chief fault of the latter being the necessity of it being submerged continuously with not less than 2 to 3 inches of water, and, when the crop ripens, the difficulty of harvesting, owing to the grain being so brittle that at the least touch it leaves the ear with a consequent loss of seed. The variety of rice now grown most extensively in the Logan district is known as the "White Java," which gives a length of straw from 4 to 6 feet, with a good flag, besides a grain of good length, fairly plump, and good cropper, and, so far, seems fairly free from disease or rust. Other varieties now being tried are the "China," "Kobe Japan," "Batavia River," and "Italian Upland," of which the White Java and the Italian Upland have been obtained through the medium of the Agricultural Department.

In preparing the land for planting, ordinary methods need only be adopted—that is, to first plough, leaving the soil to lay for a week or so, to aerate and sweeten, then crossplough and harrow, bringing the soil to as fine a tilth as possible. The best time in this district for planting (and I should think it a suitable time for all districts south of Rockhampton) is at the end of September or at the beginning of October, when we get the first rains. In cultivating for rice on hillsides or sloping land with a natural rapid drainage, it would be advantageous to slightly terrace the land crossways to the fall of the hill, leaving an open catchment drain on the higher side, blocked at each end to conserve the rain water, because even so-called upland rice must have a certain amount of moisture, and by the construction of the above drain, or dam so to speak, the gradual percolation of the conserved water will have the desired effect of helping to supply the necessary moisture, which would be about 20 to 30 inches of rainfall spread over the period of growth. This rainfall has produced very good crops of fair yielding grain.

SOWING THE SEED.

In sowing the seed we have to be determined as to our requirements—if for cropping for grain or for fodder purposes only. There are three systems: Broadcast chiefly for fodder purposes, planting in drills, and transplanting from nursery beds. In the first instance—*i.e.*, sowing broadcast—it will take a bushel (60 lb. of paddy) to the acre, the seed being harrowed and treated in the same manner as oats or wheat in the after cultivation. But the plan most generally adopted, and by far the best, is planting the rice in drills 2 feet 6 inches or 3 feet apart, and about 10 to 12 inches between the plants, which may be done

successfully with an automatic seeder. By this method, about 35 to 40 lb. seed to the acre are required. It ensures the crop being more even and not so patchy as when sown broadcast, and allows a better chance of going through the crop with hoe or cultivator to remove any weeds that may have made their appearance before the rice has got fairly started. The system of planting in nursery beds and transplanting out is adopted chiefly in planting swamp rice or the "Aman" variety; but, as this system of planting entails a lot of labour, I do not think it will ever come into active operation in this State. The mode of operations with this variety is briefly as follows:—Beds are prepared according to the area to be planted; a bed about 20 feet long and 6 feet wide will be amply large enough to grow plants for a quarter of an acre, the beds being well made and enriched, so as to produce vigorous plants. Sow the seed and rake in carefully, watering at certain intervals. Care must be taken to keep the plants growing. When the plants are about 6 inches high they are ready for transplanting to their permanent beds, which is done by making holes about 10 inches to 1 foot apart in the rows and 2 feet 6 inches between the rows. But, as before pointed out, this is a most tedious and costly mode of planting, and the labour involved is a serious item for consideration. You might as well try to transplant a field of oats or wheat, and expect to get a profit. So that it will be easily seen the planting in drills is at once the most economical and systematic, besides being the one most generally adopted.

HARVESTING THE CROP.

This was a difficult matter to undertake with the rice formerly planted in the Logan district, the China and some of the Japan varieties being so brittle that when ripe the least touch caused the grains to drop off with a consequent loss of seed. This has been happily overcome to a certain extent by the better variety planted. Not only does the White Java give better facility for harvesting, but the straw is of a better colour and quality, of a good length, averaging from 4 feet to 5 feet, and in good land even 6 feet is no unusual length; and no more fairer or gratifying sight to the farmer's eyes can be imagined than the rich appearance of a rice-field ready for harvesting: this is whilst the stalks have still a bronze-green appearance, the heads have turned a golden brown, about half-way down, and appear what a wheat farmer or an inexperienced person would deem three-parts ripe. The heads of rice, heavy with grain, have a graceful, drooping appearance; as many as thirty to forty heads have been produced from a single grain planted—the product weighing from 10 oz. to 14 oz. By cutting some varieties of rice in this state, the loss is not so great as with over-ripe grain. The cutting is begun in the morning as soon as the dew is off, the rice being bound up into very small bundles, ready to be threshed as soon as possible (which will be explained later on). Rice is never left stooked in the field, but is treated as quickly as possible.

The usual method pursued in harvesting is to cut with the ordinary sickle or reaping-hook, although where large areas are now being planted it is thought that the latest inventions of wheat-harvesting machinery could be used most effectively. A slight alteration in the reaper and binder might be required in the way of lighter and broader wheels on the rich soft rice lands, but otherwise I see no difficulty in the harvesting. At all events, it is the intention of the writer to induce some firm to make a trial at next harvesting as an experiment, and if successful a machine will doubtless be obtained on co-operative lines for the use of the district. After cutting with the sickle, the rice is gathered into bundles and carted into the barn or shed, or, if not sufficiently dry, is left for a day or so to ripen; but this is not often the case, experience having taught our farmers the right time to cut, and it is generally taken to the barn at once for stripping or threshing.

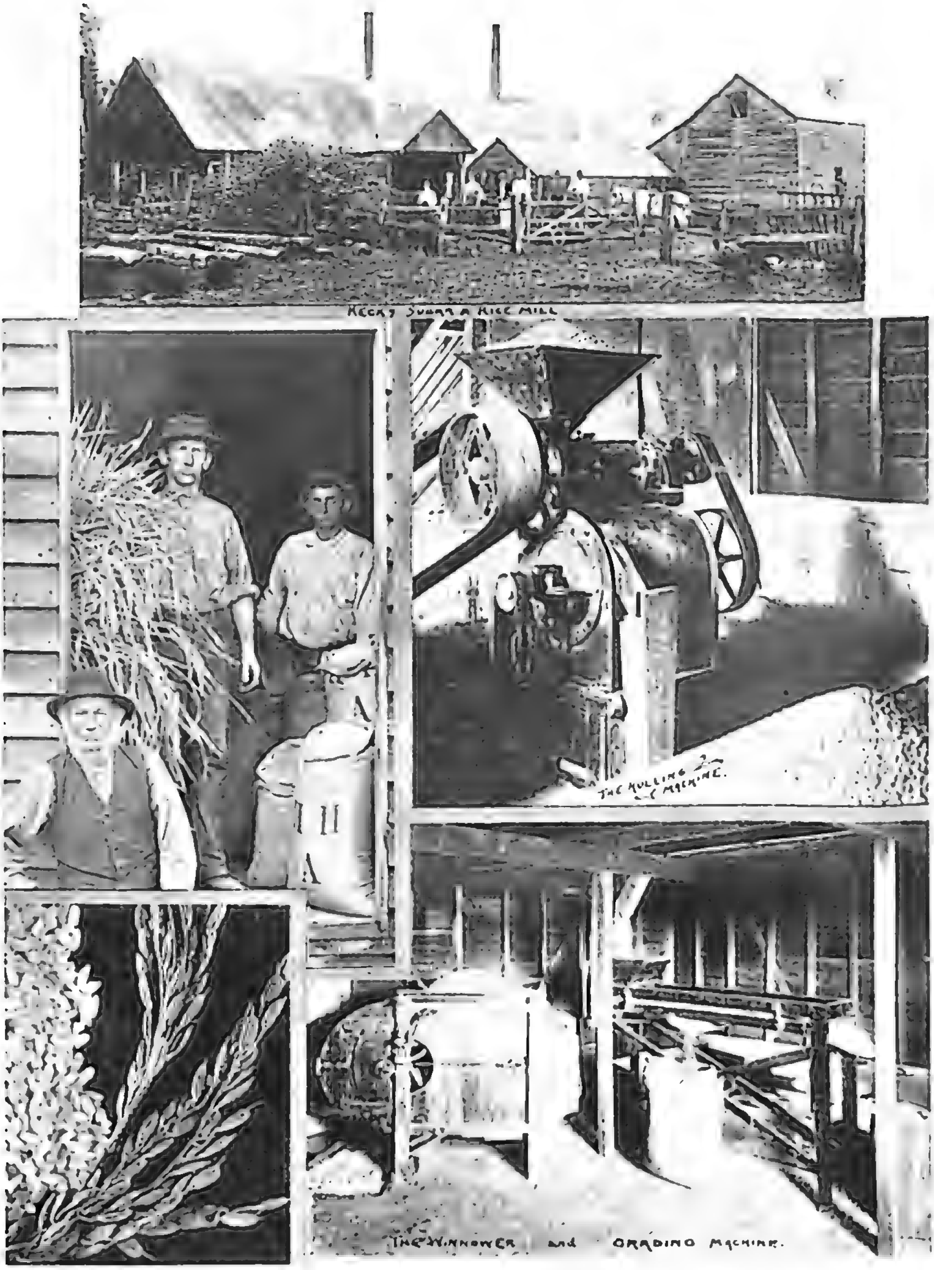
THRESHING THE RICE.

Where there are large quantities, this can be done with the ordinary flail on a threshing-floor, but other systems are in vogue where only small quantities are grown. One plan of threshing is by driving four forks into the

Plate V.

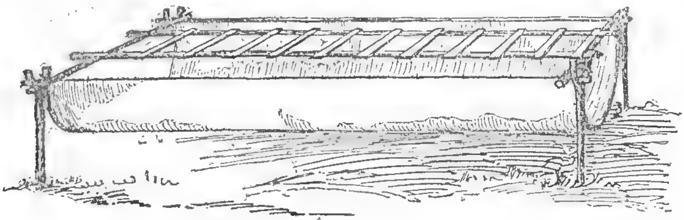
HARVESTING RICE.

Plate VI.



Rice Mill, Pimpama Island.

ground, about 4 or 5 feet apart in width and 10 or 12 feet long, placing two long saplings lengthways and two crossways. Over these a sheet or tarpaulin is placed to hang and form a sort of long trough. In the centre, resting on the cross pieces, a rough kind of ladder is placed, and the bundles of rice are then beaten over the bars of the ladder, which causes the grain to drop into the bag, as shown in the sketch. Some farmers merely nail a few strips across a box or



wooden trough, and beat the rice out on this by handfuls. After the grain is beaten from the straw (it is then known as paddy), the next operation is the winnowing. This is done in an ordinary sieve by letting the grain fall on to a sheet in a light breeze, the sieve being held up at a little distance; its weight causes the sound grain to fall on the sheet, whilst the light grain, bits of straw, &c., are wafted away to one side. The paddy is then carefully collected and placed in the sun, spread out for a few days to get thoroughly dry, when it is bagged and stowed away in a dry barn, or else taken away to the miller for turning into the article of trade and commerce with which we are more familiar, and known as rice and not paddy. The straw, after the grain is threshed out, is spread out to dry or cure, or else it is fed to the stock. A great deal of nutriment remains in the stalk at the time of threshing, and I believe it would make up into a splendid ensilage if desired to be used when other feed is scarce. I should be pleased to hear the results if any of our enterprising farmers will give it a trial.

MILLING THE RICE AND PREPARING THE CROP FOR MARKET.

This is a most interesting operation, and for the want of the necessary machinery the rice industry has lain dormant for several years in the Logan district. Every credit must be given to Mr. F. W. Peck (the writer of this article) for the energy and enthusiasm he has displayed in reorganising the industry, and the farmers, through the medium of the Logan Farming and Industrial Association, who took the matter up, believing that a great benefit would result to the district if only carried out in a systematic manner. The matter was ably discussed at their meetings. The Agricultural Department was written to for advice, and their assistance was given as far as possible to facilitate the objects sought to be obtained. It was from information supplied by the Department that the farmers were induced to co-operate in the purchase of a new and better variety of seed, a quantity of White Java—900 lb.—being purchased and distributed at first cost among the farmers; next, a small experimental patch was started, the Department supplying rice seed of other varieties, which are now being tested for their producing and milling qualities, the seeds from this source being again redistributed free of charge to those willing to grow them and still further test the various kinds submitted.

With the large increase of area planted, the want of a mill began to make itself felt. The prices offered for Queensland-grown rice were very low, principally owing to no local mills in Southern Queensland being established at that time. Again the Department of Agriculture was appealed to, and the address was obtained of the latest up-to-date firm of manufacturers of rice-milling machinery. This was the Engleburg Huller Co., of Syracuse, U.S.A., who were promptly written to for information, and price-lists and catalogues were received from them. A meeting of the farmers was called, and an

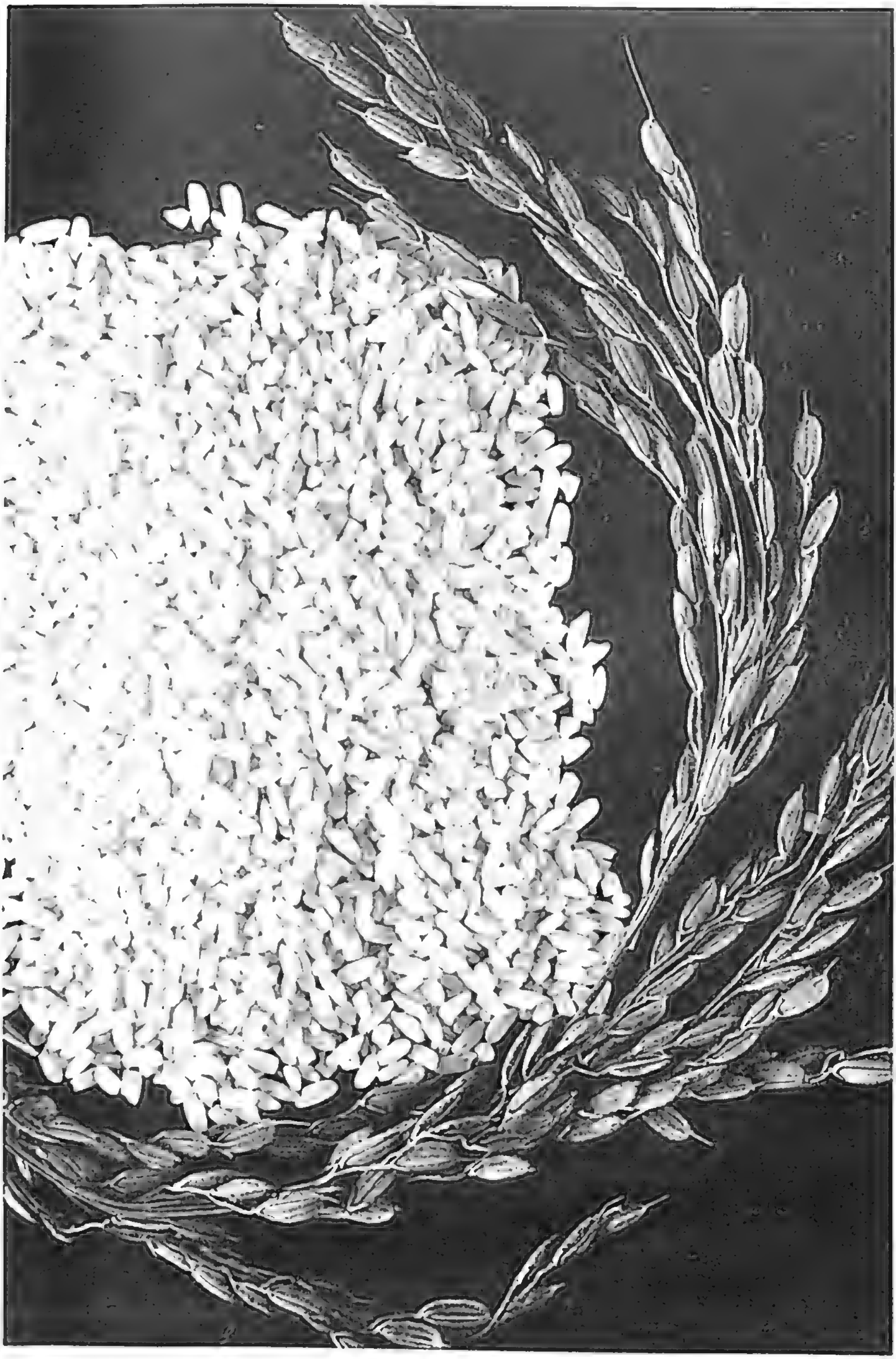
endeavour was made to get a co-operative mill, but without success, the general opinion being that growing and manufacture were two different branches of the business, and that milling would be better undertaken by a local sugar-miller, who would have the necessary engine power to work the rice-mill at times when the sugar season was over. This was eventually the plan adopted. Mr. Wm. Heck, who owns a sugar-mill on Pimpama Island, sent for and erected the necessary buildings and machinery as an adjunct to the sugar-milling industry. A neat weatherboard structure, the dimensions being 28 feet long, 18 feet wide, and 22 feet high (two story), was erected on stumps to keep the floors dry—an essential in ricemilling operations—a floor being placed about 10 feet high from the basement floor and extending the full length of the building. Upon this floor is erected the Engleburg Huller and Polisher, a neat little machine known as the "No. 4 size," and capable of treating half-a-ton of dressed rice per day. The paddy, being run into the hopper of the machine, falls on to a cylinder which revolves at high speed and most effectually "hulls"—that is, rubs off the cuticle or outer skin—and polishes the grain in one operation. The pollard or residuum from the rice (hulling and polishing) falls on the floor, whilst the grain itself descends to the lower or basement story of the building by means of a shoot which conducts it into a machine placed to receive it, and known as a grader, which is worked and fed automatically from the machine above. There are four sieves or sifters in this grading machine which separate the broken grains, and also the polished rice into first, second, and third quality, the rice being caught in bags or boxes placed to receive it. It is then ordinarily ready for market, but Mr. Heck has added another machine to his mill, known as an improved winnowing machine; this machine, by a series of cogs and cranks, makes the rice pass through another set of sieves, and, at the same time, the wind from a rotary fan contained in the machine and driven at a high velocity clears off any impurities of husk, dust, &c., that may be with the rice after leaving the grading machine, and completes the milling operations by finishing the product in a perfectly clean and highly polished state. Samples of this rice were exhibited at the last National Agricultural Society's Show in Brisbane, and submitted to experts, who expressed themselves as pleased at the improved samples displayed, which were equal to any imported rice of the same variety and very little different from the best Japan.

THE RICE CROP—WILL IT PAY?

This is the question invariably put to the writer whenever advocating the growing of rice as one of the crops to be successfully undertaken in the coastal districts of this State.

In the first place, take the cropping. In ordinary situations, with only fair cultivation, from 30 to 40 bushels of 60 lb. of paddy can be obtained per acre, which is double the wheat yield, the average crop of wheat being from 15 to 20 bushels per acre. I know in some instances these quantities have been exceeded in both crops, but I give a fair average for comparison. The value of wheat per bushel ranges from 3s. to 3s. 6d., whilst the value of rice sold to the local mill averages from 4s. to 5s. per bushel delivered at the mills. Then dry rice chaff is of great value as a feed for stock and horses, and I feel sure, if placed on the market and once fairly tested, it would command a ready sale. The straw is less hard, and, when well dried, compares favourably with oaten straw, and a fairly low estimate would give (according to variety grown) from 3 to 4 tons per acre, of an estimated value of £2 to £3 per ton, or an average to the grower per acre of straw and grain of £15 10s. per six months' crop. Of course, in favoured districts two crops can be obtained in the year—that is, where frosts do not appear. Then the above figures would have to be doubled as a yearly income, but, in the Logan district, only one crop of rice is taken, to be followed by a late crop of some other kind, such as oats, &c. Of course, the greatest benefit is derived by the grower on a large scale if he does his own milling. A glance at the prices paid for paddy and the prices now

Plate VII.



Head of Rice and Hulled Rice
Natural Size.

obtainable for the finished product will be worth consideration. Taking the current prices of rice, at the time of writing, in the Brisbane market, duty paid, best Japan is £24 per ton. The commonest quality of imported rice, "Rangoon," fetches, duty paid, £19. This price gives a fair margin of profit to the local miller if he sells at £18 per ton. The samples being milled this season at the Pimpama Island Mill are of very high grade, and closely resemble "Patna" in shape of grain, but slightly darker in colour. Taking, then, the local rice at £18 per ton market value, to produce which 1 ton 10 cwt. of paddy would be required (according to records taken at recent trials) to be milled, of a value of £12 9s. 9d.; this would leave a margin of £5 10s. 3d. I will add here that paddy rice is bought locally like wheat at 2,240 lb. per ton, deducting the cost of milling, the average of about £2 per ton leaves the miller a net profit of £3 10s. 3d. per ton. To this must be added the value of the pollard, which also is of great value as feed for calves, pigs, or poultry, when steamed and then mixed with separator milk. Its commercial value is certainly not less than £2 to £3 per ton.

The following is taken from the Brisbane *Observer* of 29th June, 1901:—

"We were to-day shown a sample of rice grown at Pimpama Island, Moreton Bay. It resembles Patna rice in shape of grain, but is darker in colour. Qualified experts who have seen the sample say that it is the first really high-grade rice that they have seen grown in this State, and as it can be marketed at from £18 to £18 10s., should command a ready sale. The commonest quality of imported rice, Rangoon, fetches £19, duty paid, here just now, while for Japan rice £24, duty paid, is asked by the distributing houses."

The price quoted for the mill such as I have described, and which is so constructed that it can be duplicated or extended at a very small cost is, for the No. 4 machine, with a capacity of not less than half-a-ton per day, together with grader, &c., about £130, delivered at Brisbane. Of course, the buildings are extra, and the power required to drive the machinery; but worked in conjunction with any existing sugar-mill, or sawmill, &c., it would prove of great value to the district, and a source of profit on the outlay to any enterprising millowner.

FUTURE PROSPECTS OF THE RICE INDUSTRY.

Like all other crops, rice has its enemies and diseases; it has a kind of rust, smut, &c., and in some parts of Queensland grubs will take the roots, but up to the present the grub has not caused any trouble in the Logan district. The rust has yet to be dealt with, and I think this will be accomplished by experimenting with various kinds of rice seed till we meet with a rust-resisting variety. It is probable now, that under Federation the importance of rice culture will receive the attention it is worth. A large sum of money is annually expended in importing the product into the Commonwealth States, I would therefore advise all farmers to give rice a fair trial, especially as we are growing varieties that can now be classed as fairly successful on our coast lands, and where a fair average rainfall can be partly depended upon. The value of rice grown simply as fodder to cut green is great for stock feed, the stalks being sweet, juicy, and succulent, and giving a good return per acre, and all stock will eat it with avidity. The question of labour does not enter largely into rice cultivation; as I have pointed out, although a tropical product there is every facility for cultivation by present mechanical methods—that is as far as the "Aus" or upland rice is concerned; the "Aman or Boro" varieties being swamp rices needing irrigation I have not yet heard of as being grown to any great extent, and they probably never will be for some time, if at all, owing chiefly to the heavy outlay required for a suitable water supply and an irrigation plant, which can be dispensed with in growing the beforementioned varieties of upland rice, which have proved most suitable for existing conditions and our present agricultural methods of cultivation and harvesting. Of this I am certain, that the rice is one of our coming crops which, together

with coffee, will prove of great benefit to this State particularly, and a further source of wealth to our producers. The market for rice in Australia is a growing one, and it will take years before the supply overtakes the demand. Our farmers need not fear to grow the crop and invest in this industry, which will return a fair amount of profit for the labour and outlay required to produce an article which only requires care in selecting and planting the varieties to suit the market requirements. I am sure the efforts of our producers will be crowned with success, and I shall be pleased with the part I have taken in assisting the modern development of rice cultivation in Queensland.

REGISTRAR-GENERAL'S STATISTICS OF RICE PRODUCTION AND IMPORTATIONS FOR THE YEAR 1900.

Total area planted in Queensland	...	319 acres
„ quantity produced (paddy)	...	9,275 bushels
„ average would equal of clean rice		320,617 lb.
The net imports of rice for 1899 were	...	9,283,933 lb.
Of the value of	...	£50,099

The above figures represent the position as to production and consumption, and would therefore be about 3·34 per cent. of the total requirements of this State only.

[The total annual production of rice in the United States of America, which, in 1866, was 2,000,000 lb., has now reached 350,000,000 lb. It will take 8,000 large railway cars to handle the crop this season. Rice lands have risen from £2 per acre to £8 per acre; hundreds of miles of irrigation canals have been constructed. Rice has been the redemption of the prairie lands of Texas and Louisiana. In ten years the worthless lands of these two States will produce the world's demand in rice. An acre there produces 20 sacks, worth from 10s. to 16s. per sack. Where are the Queensland farmers in the race?—Ed. *Q.A.J.*]

LOSS OF WEIGHT IN EGGS DURING INCUBATION.

As the result of experiments conducted at the West Virginia University Agricultural Experiment Station by Messrs. J. H. Stewart and Horace Atwood, the following conclusions have been arrived at:—

1. Fertile eggs, when incubated in a normal manner, decrease in weight.
2. The eggs which hatched lost 4·17 per cent. of their weight during the first five days of incubation. During the seven succeeding days they lost 6·35 per cent. of the weight of the eggs at the end of the fifth day, and during the next seven days lost 6·98 per cent. of their weight at the end of the twelfth day.
3. One hundred fertile eggs of average size will lose 234·9 grams, or 8·28 oz., during the first five days of incubation; 341·8 grams, or 12·05 oz., during the next seven days; and 352·8 grams, or 12·44 oz., during the next seven days.
4. The unfertile eggs lost 3·6 per cent. of their original weight during the first five days of incubation. During the seven succeeding days they lost 5·6 per cent. of what they weighed at the end of the fifth day, and during the next seven days lost 5·6 per cent. of their weight on the twelfth day.

One hundred unfertile eggs will lose 217·2 grams, or 7·66 oz., during the first five days; 323·3 grams, or 11·40 oz., during the next seven days; 306·9 grams, or 10·82 oz., during the next seven days.

Forestry.

WILL FOREST CULTURE PAY IN QUEENSLAND?

In our notes on Forest Conservancy, Part 3 (Vol. II., p. 154), we mentioned the case of a natural growth of young blue gums (*Eucalyptus tereticornis*) springing from seed which had been scattered over the ground by the felling of several large trees in seed. The young saplings grew up straight as arrows, and the grove only required thinning out at proper times to have established a splendid stand of timber for the future.

As this occurred in the year 1864, it will be understood that had these trees been allowed to grow to the present day they would have been nearly thirty-seven years' old, and by judicious cutting and replanting we should have now possessed a crop from which a good annual income would have resulted. A correspondent, Mr. J. T. Pentzcke, of the Daintree, writes of a similar experience. He commences by putting the question—"Will forest culture pay the farmer?" This would depend greatly on the system of forestry adopted, and also to a large extent on the concessions in the way of long leases made by the State Government to men who would honestly undertake to take the matter up and carry it out in such a manner as to make the work a revenue-producing one for future generations.

Before the scrub lands on the Daintree were open for selection, the pioneer cedar-getters had already sent many shiploads of valuable cedar to the South. The only site for a sawmill was a low-lying, ti-tree, and mangrove swamp. The hardy pioneers had only a small piece of camping ground, where they suffered much from fever and ague. Mr. Pentzcke took up some land in the scrub adjoining Mr. Freshney's selection, and cleared about 4 acres, leaving two cedar trees standing in the clearing, and carefully protecting them from fire when burning off. When the crops of maize, bananas, sweet potatoes, &c., were well grown in October and November, the winged seed of those cedars began to scatter broadcast over the land, and lay thickly about on the pumpkin leaves. These germinated under the shelter of the crops, and, after the wet season was nearly over, he destroyed more than a thousand young cedar plants in clearing up the ground, besides a quantity of undergrowth, which is needed by the young trees to enable them to grow tall and slender whilst making their "height growth," a most important period for the silviculturist. The plants, being thus sheltered, do not become bushy, but draw up till they top the scrub and then commence to make lateral growth and spreading tops. Had he left the cedar and undergrowth alone, these would to-day have been a nice patch of tall valuable timber which in fifteen years' time from now would have been fit to harvest, as he has observed that the cedar on the Daintree increases by 3 inches in girth per annum. There are, besides cedar, many other valuable timbers in the scrubs, and others might be planted. Some of the native timbers there are of exquisite beauty and of great commercial value, but as yet they are only known by botanists. They require to be sent to a market where their value would be thoroughly understood. When this so devoutly to be wished consummation is attained, the foresters would go systematically to work, taking the forest on the face and felling all mature trees, get rid of weakly, useless trees, save all plants of useful kinds, and plant bare spaces with better varieties. Thus, at the outset, a rich harvest would be gathered without planting; but felling without replanting is contrary to the rules of good forestry. "Therefore," says Mr. Pentzcke, "we *must* replant in order to leave a harvest for those who come after us, for *we* shall not reap the benefit of what we have planted." In writing of the Diseases in Plant

Act, he complains that the planter is much hampered and handicapped by its operation, and maintains that the greatest pest is neglect. During the early period of cedar-getting Mr. Pentzcke's next-door neighbour had a selection comprising 160 acres. On this area he and his neighbour felled cedar-trees, which yielded 300,000 superficial feet of sound timber, whilst a great quantity was left as waste. Not a single tree was felled under 8 feet in girth, because, as all timber-getters know, cedar of less girth is not worth anything; in fact, to fell smaller trees is nothing short of criminal. As soon as the regular cedar-getters had taken off the large timber, the land was selected for farming. Then the selector cut down all the remaining timber, even that only 2 feet in diameter, and pit-sawed it. Now, had he allowed that young timber to mature, it would by this time have increased 200 per cent. in size and value. There is still a great quantity of young cedar and over eighty fine bean trees on this land, besides numbers of other excellent timbers. One acre is planted in coffee, staked with bean-tree stakes. Had the timber producing these stakes been cut in "flitches," and sold to veneer-cutters, it would have brought £6.

We are greatly obliged to Mr. Pentzcke for his interesting letter. If more Northern men were like-minded, it would not be long before private forest culture would form a valuable Northern industry. Some people scout the idea of tree-planting on the ground that they would be in their graves before any profit could be reaped from a plantation. Such people forget that all good parents try and make some provision for their children. A couple of hundred acres of cedar and pine well managed would form a legacy which would render their children independent in the prime of life.

This reminds us of a German story about tree-planting. Some travellers saw an old man of seventy planting an orchard of cherry-trees, and they asked him why he was so foolish as to plant trees, the fruit of which he could not hope to live to enjoy. "I shall probably not live to enjoy the fruit, certainly, but those who come after me will enjoy it and bless the memory of the planter," was the old man's reply.

APPLES AS A MEDICINE.

Everybody ought to know that the very best thing one can do is to eat apples just before going to bed. The apple has remarkable efficacious medicinal properties. It is an excellent brain food, because it has more phosphoric acid in easily digested shape than other fruits. It excites the action of the liver, promotes sound and healthy sleep, and thoroughly disinfects the mouth. No harm can come to even a delicate system by the eating of ripe and juicy apples before retiring for the night.

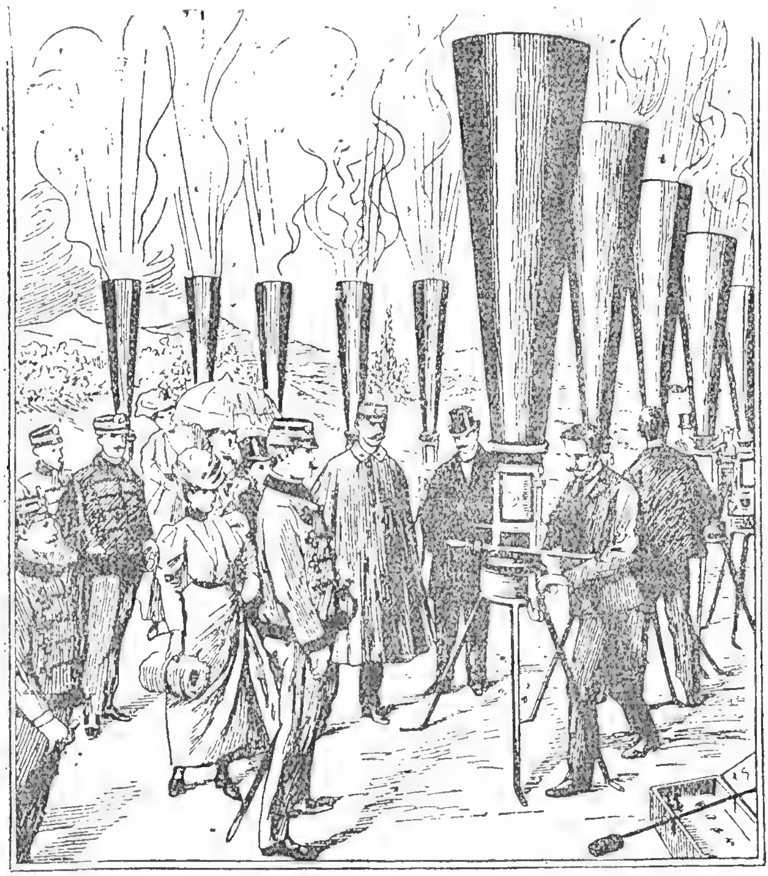
TRADE IN PINEAPPLES.

A direct trade in pineapples has now been established between Jamaica and London. We read of a consignment of 500 packages having been received in fine condition and fetching from 1s. 6d. to 2s. 6d. per pine. The favourite pine in the London market is the smooth Cayenne, and it is said that the chief reason for this fact is not so much its superior quality but its good looks, size, fine colour, and handsome top, the weight ranging foom 3 to 8 lb., the average 4 to 6 lb. Larger fruit, it is said, are not required in England. Another important fact about this particular variety is that it reaches the market in better condition than any other. Of course a sweet pine is essential for a good market.—*Tropical Agriculturist*, Ceylon.

Science.

SHOOTING IN THE AIR TO DISPEL HAILSTORMS.

For the fields, gardens, and vineyards hail is no less dangerous a foe than untimely frosts, or severe and lasting droughts. But man, with his usual energy, has taken up the struggle against the powers of Nature, which by their sudden and unseasonable appearance deprive him of the fruits of his labour and industry. In America all kinds of devices for producing, artificially, showers of rain have been experimented at great cost, but without any success. Much good, however, has been done in many wine-growing districts, in combating the late frosts that occur in spring time. Frost preventers have been created in the form of a fire, which operates effectually, and if light in time the smoke which is formed by the fire is as effective against frost as a fire-brigade against fire.



Visit of the King of Italy to a Shooting Station in Styria.

In consideration, therefore, of the damage done by hail every year, it is well worthy of consideration whether human intelligence cannot discover some effective means of protecting agriculture, by breaking or driving away hailstorms. The first attempts in this direction on a large scale

were made in Styria, and were based on a deeply rooted popular custom. For centuries it has been the custom in that country of vineyards and orchards, when a threatening bank of clouds appears on the western horizon, to fire blank shots from a certain kind of mortar, and it was always remarked, or people thought they remarked, that instead of the hail expected, nothing fell but a violent shower of rain, that seemed to increase in intensity after every shot, just as can be observed after every flash of lightning. Of late years Herr Stiger, the mayor of Windish-Feistritz, in Lower Styria, has begun to "shoot the weather" on a large scale, more systematically, and consequently with more success. Within the short space of four years not only have large parts of Styria, Lower Austria, Hungary, the Tyrol, and the whole of Upper and Central Italy been supplied with thousands of such shooting stations, but it has had the further advantage, that men of science have now begun to be interested in the matter. In November of the year 1899, there was held the first "weather shooting" congress in Casale Monferrato, which was attended by 560 practicians and scientists. The following resolution was there agreed to:—"The facts here observed have proved the benefit of firing into the air, and therefore, in face of these facts, it is immaterial whether men of science are able to explain it or not." For, as it has hitherto been impossible to form an undisputed theory as to the formation of hail, so there is also no incontrovertible explanation of the effects of firing into the air. There are, however, doubtless two factors that have to be considered—namely, the vibration of sound and the whirlwind of air caused by the shot. There are no physical grounds for believing that the waves of sound, as such, can in any way prevent the formation of hail. Were it argued that the waves of sound could produce a shock in the lower clouds, and thus suddenly prevent the formation of hail, it would doubtless be objected that wave-sounds cannot produce a shock in the air, but only an oscillation.

This shock could, however, be produced by the whirling of the air caused by shooting on the Stiger system. As early as 1896, Stiger tried to increase the effect of the explosion by attaching large funnels to the mortars; it then appeared that on firing a shot, rings of whirling air—similar to rings of smoke—would rise from the funnel, and were visible in the reflected light of the sun. These whirling rings of air are formed by the air in the funnel being set in a whirling motion by the explosion of the powder. The sound made by the sudden rising of the whirlwinds of air can, at night-time, or when the wind is still, be heard at twenty miles' distance. From the very beginning this noise was, for Stiger, the gauge by which to measure the effectiveness of the shot, and having once observed that a swallow, caught by such a whirlwind of air, fell down, he henceforth considered the mechanical force of the ring of air as the power that disturbed the formation of hail.

It now became evident that it was necessary to produce strong atmospheric whirlwinds starting with greater rapidity and lasting longer. Special machines were built for this purpose, and have now not the least resemblance with a mortar. Our illustration affords an idea of what these new "hail-destroyers," or "cloud cannons," look like; it represents a visit paid by the King of Italy to one of these shooting stations fitted out with the improved machines. The place where this experiment was made expressly for the king was an improvised shooting-station outside the St. Lorenzo Gate in Rome. Both on his arrival and on his departure the king was greeted by a regular salute from these air-cannons.

For several years past a similar apparatus as that represented in this picture was employed in Styria. A scientific investigation into the causes of the effect produced was made last year by the Viennese meteorologists, Permer and Trabert, at the desire of the Austrian Minister of Agriculture. They found the mechanic energy of the rings of air to be very considerable. The greatest effect attained in a horizontal direction was the breaking of lathes of firewood 3 metres long, 6 cm. broad, and 4 cm. thick, which were set up at a distance of 40, 60, 80, and even 100 metres from the cannon. More

minute investigations have now shown that, even with the best loadings, a greater height than 300 metres cannot be reached; so that, as the hail-clouds are considerably higher, the effect on them in this sense would be impossible. This supposition is supported by the fact that in some places, in spite of such shooting being done in the proper way, hailstorms have fallen nevertheless. It can therefore be by mere chance that the country where the Stiger experiments have been made, have hitherto been spared from hail. To wait and try again, is the only thing to be done, in spite of the many who deny any possible influence of this shooting on storm or hail. With some justice the opponents call to witness the battle of Solferino, in which hundreds of cannons were firing, and, nevertheless, a thunderstorm of such terrible violence broke between 4 and 5 o'clock in the afternoon, that hostilities had to be suspended over the whole battle-field. Against this objection, however, it should be remembered that when cannon thunder the sound does not rise straight up, but usually takes a more horizontal direction, and therefore does not reach the higher regions of air at all.—*Export Trade Journal.*

A PRACTICAL PROPOSAL.

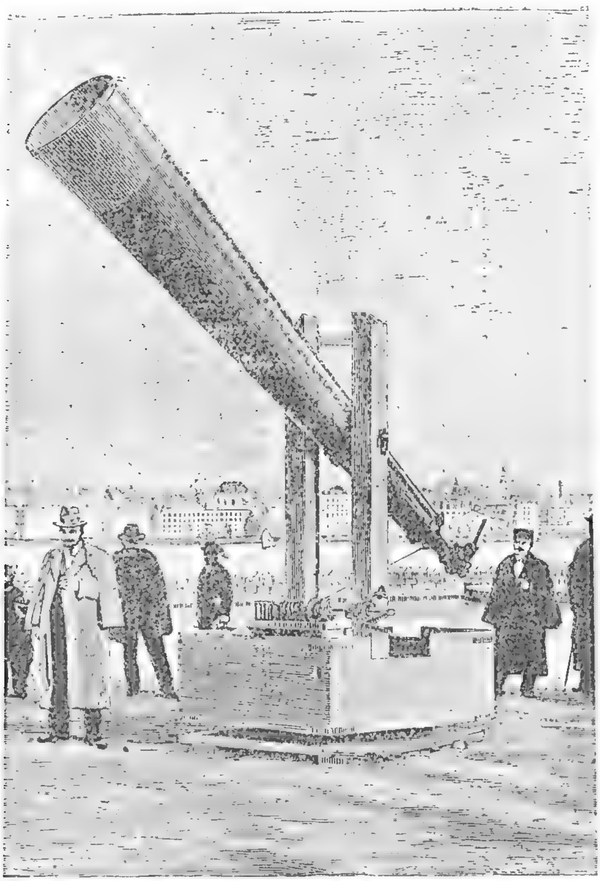
From the *Mackay Mercury* we learn that Mr. P. McKenney is determined to put weather-shooting to a practical test. He announces that he has arranged for a shilling subscription throughout the State, which he hopes to have subsidised by the Government, with the object of securing some half-dozen guns to test the efficacy of detonations as a means of making clouds break in rain. The tests proposed are to be under the guidance of Mr. Wragge. Singularly enough, it is stated that Mr. Wragge has communicated with Mr. McKenney expressing surprise that a system admitted to be successful by the scientists of the old world should be ignored in this country, yet not a word has yet been mentioned publicly, either in favour of or against the system which Mr. Wragge personally inspected. We note that the intention of Mr. McKenney is to attempt to bring rain, yet all literature on the subject of weather-shooting refers to the prevention of hail by turning it into rain. We shall be glad to publish anything on the subject from anyone who has seen the results of weather-shooting.

A NEW WEATHER-CANNON.

Ever since "weather-shooting," as it is called in Germany and Switzerland, met with such pronounced success in Styria, Upper Italy, Hungary, and France, meteorologists have been engaged in a very wordy battle as to the merits of the scheme. That something has been accomplished cannot be denied. Indeed, so successful have been the efforts in preventing hailstorms in Upper Italy that, since the experiments of 1898, some 20,000 stations have been established. At the Agricultural Congress held in Padua last November, by far the greater number of the members were in favour of the building of "weather-shooting" stations. The congress was very decidedly impressed by an account of one of last summer's (1900) hailstorms in the vicinity of Vicenza. So violent was this particular storm, the story runs, that for miles the land was completely devastated. But, in this ravaged section, one spot was spared because there, it is asserted, a number of stations had been located, which had warded off the danger.

The shooting apparatus hitherto used has been very primitive in construction. For a cannon a mortar with a funnel-like barrel was often used. In some places the funnel is fixed vertically in masonry. This method of mounting the cannon is not only crude but also dangerous, for often enough serious accidents have occurred. In order to avoid these dangers, as well as to improve the apparatus in general, a Hungarian editor, named Kanitz, has devised a simple form of cannon which is essentially a breech-loading mortar

some 30 feet in length. The mortar is journalled in a rotatable carriage, so that it can be raised and lowered and swung from side to side. The charge is a metallic cartridge of blasting powder. After the discharge a loud, shrill whistling sound is heard, lasting for about fourteen or fifteen seconds.



French and Italian winegrowers insist that, by means of the gun, clouds are torn asunder, so that rain instead of hail falls.

The grapegrowers of five departments of the French Alps have formed an association for buying cannon and powder for next summer (1901). The Italian Government has such faith in weather-shooting that it supplies winegrowers with powder at the rate of 3 cents ($1\frac{1}{2}$d.) per lb.—*Scientific American.*

HAIL PREVENTION.

In all the articles we have read on the subject of "weather-shooting," we note that stress is always laid, not upon *rain producing* but upon *hail prevention.* The fact that the hail is turned into rain does not prove that rain-clouds could be induced to deliver their moisture by means of air waves. It is hail that is the enemy to be fought. And this opens up the interesting question of the mechanical action of the air waves produced by the shock of discharge. Our own experience has shown that when the big guns at Lytton fort have been fired during very cloudy weather no rain fell. The guns, however, were not laid for high-angle fire.

The production of rain is thus shortly explained. Whatever tends to lower the temperature of the air below the dew-point is a cause of rain. Simple expansion of the air reduces the temperature, and copious downfalls of rain follow such expansion. When rain or aqueous vapour is cooled down in the atmosphere to the freezing point of water it is frozen, and falls to the earth as hail or snow. The formation of hail is not yet well understood. The discharge of the mortar is productive of air waves, which are driven upwards in the form of a parabola. Do these air waves carry with them sufficient heat to melt the hail and cause it to fall inocuously as rain? On this point we should be glad to have the explanation of Mr. Wragge, who visited the Styrian shooting stations some months ago, but as yet no report of his investigation has been made public.

ANALYSES OF QUEENSLAND GRASSES.

By J. C. BRÜNNICH, F.C.S.,
Chemist to the Department of Agriculture.

Considering the great number of valuable indigenous grasses Queensland possesses, it is to be regretted that we have so far no direct proofs with regard to their value, as nothing has been done to get at their actual feeding value with the help of analysis.

Work of this kind involves a considerable amount of time, and only just now have I succeeded in carrying out a few such analyses, with the view of comparing the well-known ***Paspalum dilatatum*** with some of the common grasses of our pastures.

The following samples of grasses were taken on the 22nd April, 1901:—

I. *Paspalum dilatatum.*—This grass was cut rather over-ripe, as some of the seeds were perfectly ripe and dropping off freely. The crop, which was grown on good cultivated land on the creek flats of the Agricultural College, was a fairly heavy one, principally considering the preceding exceptionally dry summer. The analysis of the sample compares rather unfavourably with an analysis of the same grass made by Mr. F. B. Guthrie, the Agricultural Chemist of New South Wales, published in Volume VII. of the *Agricultural Gazette* of New South Wales, May, 1896. I attribute the difference to the fact of the grass being cut over-ripe, and having being grown in exceptionally dry weather and on a larger scale. As all the crop has just been cut recently, another sample will be taken from the same ground in spring, and the analysis published in due course. Particularly striking is the great difference in the amounts of total nitrogen and amide nitrogen, which in the sample from the Wollongbar Experiment Farm were 2·66 and 1·01 respectively, whereas our own sample gave ·882 and ·112 respectively.

II. *Ordinary Pasture*, composed chiefly of *Andropogon intermedius*, *Chrysopogon parviflorus*, and *Andropogon pertusus*, and also containing specimens of the following varieties of grasses:—*Chloris truncata*, *Chloris divaricata*, *Eriochloa punctata*, *Eragrostis Brownii*, *Eragrostis pilosa*, *Anthistiria ciliata* (Kangaroo grass), *Sporobolus indicus* (Rat's-tail grass), &c. These grasses were grown on rather poor uncultivated soil on the College Hill, and the crop represents a growth of about ten weeks.

III. *Cynodon dactylon* (Common Couch Grass)—This grass was growing close to the preceding sample on the poor soil on the College Hill.

IV. *Andropogon intermedius.*—This grass—a large, tufted grass—was grown near Samples II. and III. on poor uncultivated land. It forms with *Chrysopogon parviflorus*, another tall rough grass, the principal varieties growing on the hill round the College buildings.

This variety was analysed by itself in order to compare it with the mixed pasture of Sample II.; the analyses show, as was only to be expected, very little difference.

Before giving the tabulated statement of the analyses, I must add, in explanation, that the grasses cut in the green state were weighed, then air-dried, the resulting hay again weighed, prepared for analysis, and analysed. The composition of the green grass was calculated from the analysis of the hay.

—	I.—*Paspalum dilatatum.*		II—Ordinary Pasture.		III.—*Cynodon dactylon.*		IV.—*Andropogon intermedius.*	
	Hay.	Grass.	Hay.	Grass.	Hay.	Grass.	Hay.	Grass.
Tons per acre	2·858	10·525	1·451	3·429	...	...	...	...
Lb. per acre	6,402	23,576	3,250	7,681	...	...	...	...
Per cent. of :— Moisture	10·72	72·84	9·61	57·67	9·98	65·50	9·36	63·60
Total dry substance ...	*89·28*	*27·16*	*90·39*	*42·33*	*90·02*	*34·50*	*90·64*	*36·40*
Soluble albuminoids	·96	·29	·96	·45	2·59	·99	1·05	·42
Insoluble albuminoids	3·85	1·17	3·50	1·64	7·13	2·73	3·59	1·44
Digestible fibre	26·97	8·20	29·54	13·83	33·76	12·94	32·01	12·86
Woody fibre	34·45	10·48	36·94	17·30	22·17	8·50	35·84	14·39
Soluble ash	6·06	1·84	3·09	1·45	4·78	1·83	2·79	1·12
Insoluble ash	4·08	1·24	2·57	1·20	5·27	2·02	2·62	1·05
Crude ash	*10·47*	...	*5·99*	...	*10·34*	...	*5·69*	...
Pure ash	*10·14*	*3·08*	*5·66*	*2·65*	*10·05*	*3·85*	*5·41*	*2·27*
Fat	2·03	·62	1·53	·72	1·15	·44	1·40	·56
Chlorophyl, amides, &c., by difference	10·88	3·32	12·26	5·74	13·17	5·05	11·34	4·56
Total	100·00	...	100·00	...	100·00	...	100·00	...
Amide nitrogen	·112	·034	·196	·092	·616	·236	·167	·067
Total nitrogen	·882	·268	·910	·426	2·171	·832	·910	·365
Feeding Ratio	1:	14·3	1:	14·8	1:	5·7	1÷	15·1

—			Pure Ash in Hay.	Analysis of Crude Ash.	Pure Ash in Hay.	Analysis of Crude Ash.	Pure Ash in Hay.	Analysis of Crude Ash.	Pure Ash in Hay.	Analysis of Crude Ash.
Carbonic acid ...	...	CO_2	...	·29	...	·15	...	·26	...	·14
Unburnt carbon	...	C	...	2·89	...	5·38	..	2·55	...	4·76
Silicic acid ...	...	SiO_2	5·34	51·42	3·32	54·62	5·91	57·24	3·17	55·25
Sulphuric acid ...	...	SO_3	·23	2·19	·12	1·96	·25	2·38	·14	2·48
Chlorine	...	Cl	1·82	17·50	·94	15·54	1·29	12·53	·84	14·63
Phosphoric acid	...	P_2O_5	·35	3·39	·32	5·25	·37	3·58	·28	4·87
Ferric oxyde ...	...	Fe_2O_3	·40	3·84	·11	1·76	·21	2·08	·06	1·12
Lime	...	CaO	·25	2·40	·24	3·96	·42	4·08	·15	2·54
Magnesia ...	...	MgO	·20	1·95	·27	4·46	·33	3·22	·28	4·86
Potash	...	K_2O	1·13	10·87	·38	6·21	1·40	13·51	·45	7·84
Soda	...	Na_2O	·76	7·34	·30	5·02	·15	1·50	·32	5·52
				104·08	...	104·31	102·93	102·93	...	104·01
Less oxygen equival. to Cl ...			...	3·95	...	3·50	...	2·83	...	3·30
Total			...	100·13	...	100·81	...	100·10	..	100·71

From the analyses and the ratio of digestible nitrogenous and digestible non-nitrogenous matters, we learn that couch grass is eminently suitable for the feeding of cows. Cows, when milked, require a more nitrogenous food, in order to keep them in full milk for as long a period as possible. Professor E. Wolff, in his work on the feeding of animals, gives 1·54 as a normal ratio for milking cows, and, as this ratio is almost identical with the ratio found for couch grass, the popular opinion of the excellence of this grass as a diet for milch cows is fully borne out.

From the analyses given, we also learn what crops of these various grasses take from the soil For the sake of comparison, I give in a third column figures quoted in Warington's "Chemistry of the Farm" as the composition of an ordinary crop ($1\frac{1}{2}$ tons per acre) of meadow hay.

—	*Paspalum dilatatum.*	Ordinary Pasture.	Meadow Hay.
		Lb. per acre.	
Nitrogen	56	30	49
Potash	72	12	51
Soda	49	10	9
Lime	16	8	32
Magnesia	13	9	14
Phosphoric acid	22	10	12

When studying the analyses of the grasses, it has to be kept in mind that not the whole of the various constituents is digested by the animals. The digestion again of the various animals differs considerably, as already pointed out in an earlier article on the "Composition of Foods" (August number of Vol. I. of this *Journal*). For instance, ruminants (cattle, sheep, and goats) digest of ordinary meadow hay 57 per cent. of the nitrogenous substances, 53 per cent. of the fat, 64 per cent. of the soluble carbo-hydrates, and 60 per cent. of the fibre (Warington—"Chemistry of the Farm," page 119). Horses, again, digest of ordinary meadow hay 57 per cent. of the nitrogenous substances, 24 per cent. of the fat, 55 per cent. of soluble carbo-hydrates, and 36 per cent. of the fibre (*Ibid.*, page 122).

It would be of great interest and value if similar complete analyses would be made of other varieties of grasses taken from different parts of the State and grown at different times of the year.

DECIMAL COINAGE.

Whilst other civilised nations, almost without exception, have adopted the decimal system of coinage, weights and measures, the British still maintain the old cumbrous, complicated notation. For farmers especially the decimal system is admirably adapted, although we recognise that the introduction of new weights and measures would be attended with inconvenience and much cost. But no difficulty could arise in the case of coinage, taking the sovereign as the unit of value, which is the foundation of commercial transactions over the greater portion of the business world.

The change could be effected by merely issuing two extra silver coins and doing away with the threepenny bit. Instead of the present nomenclature of pounds, shillings, and pence, under the new system we should have pounds, florins, and mils.

Suppose the pound sterling to be worth 1,000 mils, the half-sovereign would represent 500 mils; the five-shilling piece or crown, 250 mils; the half-crown, 125 mils; the florin, 100 mils; the shilling, 50 mils; the sixpence, 25 mils. We now come to the threepenny piece, the penny, halfpenny, and farthing. These names should be done away with. Then the penny would become 4 mils; the halfpenny, 2 mils; and the farthing, 1 mil. The present farthing is $\frac{1}{960}$th of £, but in the new issue it would represent the $\frac{1}{1000}$th part of £. Two new coins would be needed under this scheme—the silver 10 mils and 20 mils pieces.

Now, let us see how such a change would be beneficial to the community at large, and more especially to the farmer. A uniform standard of weights and measures would be needed to bring out the full simplicity of the system; but, even without this, the advantages must be manifest in the reduction of the

schoolboy's labour, the farmer's calculations, and the commercial man's monetary transactions. The rule for reducing £ s. d. to farthings is to multiply successively by 20, 12, and 4; and, conversely, to reduce farthings to pounds we divide by 4, 12, and 20. In the case of the proposed decimal coinage, if we wish to reduce, say, £25 to mils, we simply add three noughts; if we wish to turn mils into pounds, we cut off the three last figures by a comma, thus:—178972 mils become £178,972 mils. The 972 mils, by cutting off the last two figures, become 9 florins 72 mils. So that the reduction of 178972 to higher values is effected by inserting two commas or points, and is thus shown to be £178 9 fl. 72 mils. The converse operation is performed by merely striking out the points. In subtraction the work is equally simple. In our present system we have a complicated carrying business and borrowing of different values. By the decimal system all subtraction is reduced to the simple rule. For instance: From £20 1 fl. 85 mils take £9 6 fl. 86 mils. We first reduce both quantities to mils by striking out the points. The question now resolves itself into taking 9686 from 20185—a simple subtraction which gives a remainder of 10499 mils. The 10499 mils are converted into £ fl. mils by the insertion of two points, thus:—£10 4 fl. 99 mils.

Nothing can be more beautifully simple than this. The long compound tables boys and girls are now obliged to commit to memory are reduced to 1,000 mils = £1; 100 mils = 1 florin.

Take division again. We ask a pupil how many times £1 10s. 6¾d. are contained in £12 4s. 6d. What has he to do? He must reduce both sums to farthings and then divide. How is it done by the decimal system? Say it is required to know how many times £1 2 fl. 28 mils are contained in £9 8 fl. 24 mils. The question resolves itself into how many times 1228 is contained in 9824 which may be seen by inspection to be 8 times. In the same simple way multiplication is performed. £9 8 fl. 24 mils multiplied by 9 becomes 9824 multiplied by 9, and the result, 88416, being mils, is expressed as £88 4 fl. 16 mils. The operation of addition of money is equally simple.

Now, if our weights and measures were also expressed decimally, quite two years' work would be saved in a boy's school life as far as compound rules are concerned.

We have now said enough on the subject to show that a change from our antiquated system to the decimal system would prove of great advantage to all classes of the community.

ORANGES IN THE UNITED KINGDOM.

Few people have any idea of the enormous number of oranges consumed in Great Britain and Ireland.

In 1899 the imports totalled 8,553,713 bushels. There is a perpetual market for Australian oranges, provided they can be landed in good order and are properly graded and packed. It will be remembered that a shipment of oranges to Vancouver, graded and packed by Mr. A. H. Benson, Instructor in Fruit Culture, arrived at its destination in such excellent order that some of the fruit was sent on from Vancouver to Winnepeg, in Manitoba. The shipment, which consisted of 105 cases, came from the fruitgrowers at Woombye and Buderim Mountain. The results were satisfactory, the net return amounting to almost 4s. per case, oranges at the time selling locally at 2s. 6d. per case. In February, March, and April, the Messrs. Holt despatched three vessels fitted up with the dry air apparatus, carrying fruit from Melbourne at £3 15s. per ton of 40 cubic feet. The owners of the White Star line are following suit, so that growers of citrus fruit in Queensland have the opportunity of getting their fruit home rapidly and in good condition. It only lies with themselves to see that it is sent away under the best condition, and thus to establish a profitable trade.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1900.								1901.				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.
North.													
Bowen	0·89	1·14	0·96	0·76	0·12	0·31	0·05	2·30	17·25	6·23	8·26	4·75	0·94
Cairns	3·56	1·66	0·20	Nil.	2·44	1·52	1·61	4·19	11·53	22·09	14·93	8·87	13·18
Geraldton	8·33	2·34	1·02	Nil.	2·63	3·17	2·39	18·68	23·32	32·93	37·64	26·10	26·72
Herberton	0·57	0·12	0·98	Nil.	0·74	Nil.	3·11	4·01	8·25	4·16	10·95	2·87	3·80
Hughenden	0·11	0·02	2·45	Nil.	0·14	Nil.	0·10	0·61	1·62	1·41	2·82	1·74	3·48
Kamerunga	3·65	Nil.	0·18	0·03	1·42	1·98	1·28	2·38	15·91	22·36	13·09	9·57	13·18
Longreach	0·14	Nil.	2·34	0·50	Nil.	Nil.	0·19	0·11	0·41	0·22	3·09	2·56	5·95
Lucinda	9·08	1·10	1·04	0·08	0·44	1·33	0·88	2·48	31·80	24·76	15·78	9·16	8·63
Mackay	2·89	2·00	3·25	0·74	1·19	0·48	0·12	7·00	24·85	8·99	10·13	6·80	1·32
Rockhampton	1·38	0·71	1·70	0·92	2·52	0·53	1·15	0·68	0·49	8·26	5·53	2·84	0·79
Townsville	2·31	0·41	0·57	0·12	0·25	0·91	0·05	0·76	14·91	12·94	4·95	3·13	0·74
South.													
Barcaldine	1·38	0·29	4·38	1·63	0·03	Nil.	0·30	1·20	0·15	1·17	3·70	1·90	2·21
Beenleigh	7·55	2·18	4·77	1·06	1·90	0·26	2·80	1·49	5·99	4·30	11·44	4·17	4·55
Biggenden	3·06	1·43	3·23	0·98	3·07	0·87	1·65	0·06	1·11	2·55	6·19	6·35	1·47
Blackall	2·19	0·33	2·21	0·66	0·12	Nil.	0·29	0·17	0·29	0·90	2·28	3·96	3·80
Brisbane	5·45	2 68	4·36	0·79	1·52	0·14	2·48	0·55	3·43	2·96	11·70	3·10	2·29
Bundaberg	3·97	1·46	5·20	1·14	1·56	3·05	1·06	1·28	2·34	2·61	3·17	10·27	1·14
Caboolture	7·04	2·14	3·73	1·56	2·94	1·99	0·86	2·11	1·11	5·51	11·53	4·64	3·34
Charleville	1·15	1·31	1·80	0·13	0·59	0·13	0·19	1·13	0·19	0·22	1·10	2·61	3·28
Dalby	2·54	1·29	1·70	1·72	1·67	Nil.	1·77	3·37	2·89	0·44	4·77	3·12	1·12
Emerald	2·72	1·15	3·96	0·52	0·35	0·18	0·31	1·08	3·65	4·43	3·25	0·88	1·31
Esk	4·78	1·89	2·85	1·39	3·00	Nil.	1·35	1·80	3·99	3·15	8·36	4·11	1·78
Gatton College ...	4·24	1·15	2·73	1·33	2·81	Nil.	4·12	0·47	6·27	1·54	6·73	3·86	1·55
Gayndah	2·57	0·88	3·36	1·42	3·23	3·21	1·84	0·08	1·22	2·10	4·22	3·97	0·97
Gindie	3·01	0·92	3·01	0·55	0·22	0·27	0·49	1·32	1·57	1·62	2·07	0·44	1·21
Gympie	3·63	0·82	3·34	0·84	5·67	0·18	0·84	0·47	2·57	3·10	18·56	3·89	3·38
Ipswich	4·73	1·45	2·25	1·17	1·37	0·01	3·93	0·47	2·09	2·88	7·01	3·38	1·43
Laidley	4·36	1·41	2·28	1·08	2·39	Nil.	4·55	0·63	4·01	1·58	6·94	3·81	1·47
Maryborough	4·33	1·21	4·32	0·57	3·55	1·22	0·68	1·18	5·03	5·51	11·76	5·58	4·09
Nambour	7·77	1·35	3·42	1·81	4·15	0·52	1·91	2·19	4·25	9·13	18·01	3·33	7·25
Nerang	18·28	2·84	7·74	1·08	2·79	0·26	3·02	2·92	4·26	4·22	14·91	5·12	5·42
Roma	2·07	2·14	2·14	1·05	0·77	0·66	2·20	3·28	1·13	0·11	1·77	1·11	1·11
Stanthorpe	3·17	1·22	2·26	1·50	3·98	0·23	2·17	2·16	1·94	0·80	3·95	2·13	0·77
Taroom	2·55	1·40	2·46	2·94	2·26	1·47	0·45	0·29	1·40	0·10	3·15	1·88	1·70
Tambo	2·94	1·49	1·75	0·59	0·19	Nil.	1·87	1·52	0·52	0·51	1·66	2·75	2·85
Tewantin	5·90	3·03	5·89	1·97	5·78	1·48	0·74	0·95	7·04	14·18	20·33	11·70	12·20
Texas	3·35	1·86	2·72	0·66	2·68	0·35	2·67	3·33	1·29	1·35	4·58	1·46	1·10
Toowoomba	4·67	1·69	2·47	1·35	1·95	0·43	2·42	2·40	3·60	1·76	6·84	6·59	1·04
Warwick	3·31	1·23	1·99	1·11	2·72	0·13	2·01	2·50	2·90	0·26	5·56	2·91	0·82
Westbrook	3·04	1·16	1·85	1·18	0·60	0·04	4·59	1·35	1·88	0·73	4·37	3·38	0·74

CLEMENT L. WRAGGE,
Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

Butter.—Australian choicest, market quite over until autumn (September and October). Last quotations, 100s. to 110s. to 114s. New Zealand choicest, 100s. to 104s. Danish choicest, 102s. to 104s. Canadian, 95s. to 98s. per cwt.

Cheese.—American choicest, 46s. to 48s.; Canadian, 47s. to 49s.; New Zealand, 48s. to 49s. per cwt.

Sugar.—Refined (new duties, 2s. to 4s. 2d. per cwt.) W.I. crystals, fine, £19; English, £14 to £15 6s. per ton; German beet, 88 per cent., 9s. 4½d. per cwt.; First Mark (granulated) f.o.b. Hamburg, 11s.

Syrups.—(New duty, 2s. per cwt.) 8s. 6d. to 17s. per cwt.

Molasses.—(New duty, 2s. per cwt.) 6s. to 7s. per cwt.

RICE.—(Duty free) Rangoon, 9s. to 16s.; Japan, 14s. to 22s.; Java, 21s. to 25s.; Patna, 20s. to 24s. per cwt.

COFFEE.—(In bond, duty 1½d. per lb. and ¼ per cent.) Ceylon plantation, finest, 84s. to 110s.; peaberry, 50s. to 112s.; small to good middling, 42s. to 80s.; Mocha, 70s. to 90s.; Jamaica, low middling to fine, 46s. to 86s.; finest, 90s. to 106s.; Santos (Brazil), 30s. to 50s. per cwt.

ARROWROOT.—Bermuda, 1s. 6d. to 1s. 10d.; St. Vincent, 1½d. to 4½d.; Natal, 5½d. to 7½d. per lb.

WHEAT.—(Duty free) Australian, 30s. to 32s.; Duluth, 34s. 6d. to 35s.; Manitoba, 33s. to 35s. per 496 lb.

FLOUR.—Australian, 18s. to 21s. per 280 lb.

MALTING BARLEY.—English, 27s. 6d. to 34s.; New Zealand, 25s. to 28s. per 448 lb.

OATS.—New Zealand, 23s. to 28s. per 384 lb.; Canadian, 16s. to 17s. per 320 lb.

SPLIT PEAS.—36s. to 40s. to 50s. per 504 lb.

GINGER.—(Duty free) Cochin, good to finest, 75s. to 85s.; Jamaica, fine to finest, 65s. to 80s. per cwt.

PEPPER.—Capsicums, 20s. to 90s.; Chillies, 35s. to 55s. per cwt.

TOBACCO.—Thomas H. Edwards and Co., Liverpool, report the following prices:—

LEAF.	1901.
WESTERN—	
Common Export	— @ —
African Export	— @ 5 @ 6½
Short Trade	3 @ 4
Medium to good Trade	4½ @ 6
BURLEY	6 @ 7½ @ 8
VIRGINIA DARK—	
Common Export	none
Short Trade	— @ 3½
Medium Trade	4 ,, 5
Good to fine Trade	5¼ @ —
VIRGINIA AND CAROLINA BRIGHT—	
Common or Semi-bright	4 @ 6
Medium or Mixed	6½ @ 8 @ —
Good to fine	9½ @ 11 @ 15

Stocks on hand, 30th April, 92,178 hogsheads, or 160,863,000 lb.

WINE.—Prices remain as quoted last month.

GREEN FRUIT.—Apples, Australian, 10s. to 16s. per case; colonial pears, 28s. per case; pineapples, 3s. to 5s. each; oranges, common, 12s. 6d. to 13s. 6d.; medium, 14s. to 15s.; fine, 16s. to 18s.; finest, selected, 24s. to 39s. per 420; lemons, finest selected, 13s. to 17s.; ordinary to fine, 6s. to 9s. per case; bananas, 8s. to 11s. per bunch.

COTTON.—Clean upland, 5½d. per lb.

COTTON SEED.—£6 12s. to £6 14s. per ton.

OIL CAKE.—£4 10s. to £4 15s. per ton.

COTTON-SEED OIL.—Crude, £19 15s. to £20 per ton.

EGGS.—French, 8s. 6d. to 9s.; Russian, 4s. 9d. to 5s.; Danish, 6s. 6d. to 7s. 9d. per 120.

HONEY.—Australian, no quotation; Californian, 9s. per dozen 1-lb. jars.

BEESWAX.—1s. 2d. to 1s. 5d. per lb.

OLIVE OIL.—£36 to £41; eating oil, £50; sublime, £60 to £65 per tun.

Linseed.—51s. 6d. per quarter.

Linseed Oil.—£28 to £28 10s. per ton.

Linseed Oil Cake.—£7 17s. 6d. to £8 per ton.

Manila Hemp.—A sample from Queensland has been valued at £25 per ton.

New Zealand Hemp.—£24 per ton.

Wool.—At the last series of London wool sales, prices ruled 5 per cent. lower than at the previous sales.

Frozen Meat.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison) :—

	June 29.	July 6.
New Zealand Mutton. (Crossbred Wethers and Merino Ewes.)		
Canterbury	$4\frac{1}{4}$d.	$4\frac{1}{4}$d.
Dunedin and Southland	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
North Island	3 1/16d.	3 1/16d.
Australian Mutton. (Crossbred and Merino Wethers.)		
Heavy (over 50 lb.)	$2\frac{1}{2}$d.	$2\frac{1}{2}$d.
Light (under 50 lb.)	$2\frac{1}{2}$d.	2 9/16d.
River Plate Mutton. (Crossbred and Merino Wethers.)		
Heavy	$2\frac{1}{2}$d.	$2\frac{1}{2}$d.
Light	$2\frac{1}{2}$d.	$2\frac{1}{2}$d.
New Zealand Lambs.		
Prime Canterbury (32 lb. to 42 lb.)	5 7/16d.	$5\frac{3}{8}$d.
Fair average	5 5/16d.	$5\frac{1}{4}$d.
Australian Lambs.		
Prime (32 lb. to 40 lb.)	—	—
Fair average	—	—
New Zealand Frozen Beef. (Fair Average Quality.)		
Ox, fores (100 lb. to 200 lb.) ...	$2\frac{1}{8}$d.	2 1/16d.
Ox, hinds (180 lb. to 200 lb.) ...	$3\frac{3}{4}$d.	$3\frac{3}{4}$d.
Australian Frozen Beef. (Fair Average Quality.)		
Ox, fores (100 lb. to 200 lb.) ...	2d.	2d.
Ox, hinds (160 lb. to 200 lb.) ...	$3\frac{3}{8}$d.	3 7/16d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotation is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

Bacon.—Irish, 60s. to 73s.; American, 44s. to 52s.; Canadian, 58s. to 66s. per cwt.

Hams.—Irish, 88s. to 100s.; American, 51s. to 57s. per cwt.

Hides.—Ox, 95 lb. and upwards, $4\frac{1}{2}$d.; 85 lb., $4\frac{1}{2}$d.; 65 lb. to 74 lb., $3\frac{7}{8}$d. per lb.

Tallow.—Mutton, fine, 28s.; medium, 26s.; beef, fine, 26s. 9d.; medium, 25s. 6d. per cwt.

Animal Pathology.

EXPERIMENTAL TRANSMISSION OF BOVINE MALARIA, CONTINUED FROM PART 6, JUNE, 1901.

(By Dr. J. LIGNIERES, Chief of Staff, Veterinary College, Alfort, Specialist selected by the Pasteur Institute to investigate the infectious diseases of cattle in the Argentina Republic.)

(Translated by A. J. BOYD.)

Whatever may be the means employed, the amount of virulent products injected, their richness in piriform hæmatozoa, the result of inoculation is always negative in the case of the horse, the ass, the sheep, the pig, the dog, the cat, the guinea-pig, the rabbit, the mouse, the rat, the hen, and the pigeon.

One may accidentally kill these animals, as I have said, in dealing with the properties of the blood, but the development of hæmatozoa will never be proved.

On the other hand, nothing is more easy than to communicate the disease to the adult bullock; the calf, however, often resists infection.

The blood and all the infected tissues may be used for inoculation. I would, however, draw attention to the fact that the inoculation is negative if the hœmatozoa have begun to form spores after complete withdrawal from their protoplasm.

In this may be found the explanation of the checks which I experienced; the obstacles I met with when, at temperatures of from 30° to 36° C., and after a journey of from thirty to thirty-five hours, I brought to my laboratory either blood or viscera of diseased animals taken in the infested provinces, and with which I subsequently inoculated animals in even enormous doses.

The bovine malaria may be communicated (inoculated) by different methods. For instance, I have successfully produced it in bullocks by intravenous, by sub-cutaneous, peritoneal, pleural, pulmonary, intra-muscular, intercerebral injections, by scarifications and by punctures.* I failed when I tried to communicate the disease through the digestive organs.

Amongst all the methods of inoculation, the most reliable are the intravenous, the intra-muscular, and the sub-cutaneous. In the last case, inflammatory reaction never supervenes at the point of inoculation.

All animals are not equally liable to contract the disease by experimental means. In immune localities may be found, seldom, it is true, cattle which are very little troubled by the action of the parasite, and in which the disease assumes the mild form.

Those suffering from debility, anæmic animals, and such as have some chronic affection, are very susceptible.

Assuming that the substances employed are not always very rich in hæmatozoa, and in order to avoid failures, I would advise, for preference, strong doses, 5 to 10 c.c.

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* I illustrate here the first example of experimental bovine malaria, produced by puncture:—

On the 18th August, 1899, a number of superficial punctures were made on a bull with a fine needle, on the inside part of the thighs and of the testicles. As soon as the punctures were made, the parts were rubbed with blood rich in piriform hæmatozoa, taken at the same time from the jugular vein of an affected beast.

The temperature remained normal until the 22nd August.

On the 23rd, it rose to 39°5 C., and I found a few micro-organisms in the corpuscles.

On the 24th, the temperature was 40°4 C. Then the *Piroplasma bigeminum* was easily detected in the corpuscles; the urine was deep red in colour.

25th August, temperature 41°2 C. Hæmatozoa very numerous; urine, red.

26th August, temperature 40°5 C. Fewer hæmatozoa; urine, red.

27th August, temperature 39°3 C. Few hæmatozoa; urine, albuminous, of normal colour.

28th August, temperature 38°7 C. The animal fully convalescent. Thus this beast has had the classical experimental malaria.

A control inoculated in the jugular with 10 c.c. of the same blood was affected 24 hours before this bull. I may add that a second bull, inoculated at the same time as the first, and also by punctures, died on the 26th August.

I have often obtained no result, not even a rise in temperature, after a sub-cutaneous injection of 1 c.c. of blood, whilst 10 c.c. by intra-venous injection, produced an outbreak of malaria.

At the same time, positive results may be obtained with very small doses. Thus, I have caused disease of a virulent type, and have occasionally killed an animal with $\frac{1}{10}$ c.c., and even with $\frac{1}{20}$ c.c.

The blood retains its virulence for a variable period, according to the stage of the disease. It may retain it sometimes for six, eight or ten days at the temperature of the laboratory. In other cases, twenty-four hours after withdrawal, it may be injected into a receptive beast without effect. The surrounding temperature is not of itself sufficient to account for this variability. In fact, if the blood of several diseased animals be taken at the same moment, and if all are placed under identical conditions, a very great difference may be observed in their virulence.

At this time of writing I have inoculated 127 cattle, amongst which I had an uninterrupted series of 42, and of these, 32 died, or say, 76 per cent. Such a large number of experiments enabled me to reproduce almost all the clinical forms of the natural disease.

By successive intra-venous injections of 10 c.c. of blood, I have obtained, in a given time, a virus which was certain death four or five days after inoculation, and often some hours after the appearance of the first characteristic symptoms of the disease.*

I have distinguished, in the natural malaria and especially in the experimental, a typical form in which the symptoms and the lesions coincide with the infection of the infiltrated blood and the change in the blood; also, an atypical form in which the examination of the blood often shows no evidence of the gravity of the disease, nor even sometimes of the nature of the infection.

TYPICAL FORMS.

1.—VIRULENT DISEASE TERMINATING QUICKLY IN DEATH.

(Plate XII.)

Bullock No. 108, Cross-bred Durham.—Age, 18 months.

On June 1st, 1899, I inject into the vein of this animal 12 c.c. of very virulent blood. The temperature at the moment of inoculation is 39° C.

June 2.—Temperature 39°7 C.; the general condition is good. I find nothing in the corpuscles, the number of which amounts to 8,200,000 per m.m.c.

June 3.—Temp. 39°6 C.; the appetite is very good; there is nothing to denote any infection whatever; yet it is easy to find hæmatozoa in the corpuscles, which now number 6,100,000 per c.c.m.

June 4.—Temp. 40° C. The animal still feeds, but with less appetite than on the previous evening; it appears much depressed, yet, at the same time, shows great energy when roused to excitement; the excrements are semi-fluid, greenish, and exhale a fetid odour; when exposed to the air they assume a characteristic rusty appearance. The urine has a yellow tinge, and contains a little albumen. The respiration and pulsations are slightly accelerated. Hæmatozoa are easily detected in the corpuscles, the number of the latter having fallen to 1,350,000 per m.m.c. The serum has a distinct pink colour. At 9 p.m. the urine is slightly rose-coloured.

June 5.—Temp. 41°5 C. The animal is now at once seen to be ill; it takes no food; the respirations rise to 75 and the pulsations to 100 per minute. The urine is deep red, and contains a great deal of albumen. The blood is very clear; the serum is decidedly red.

I can only count 56,420 red corpuscles per m.m.c. An enormous number of endo-globular, piriform parasites is found in the blood of the jugular; 30 to 40 per cent. of the corpuscles are infected; some of them have lost their colouring matter, and only present a very faint outline; there are *Piroplasma* in perfect freedom in the serum.

June 6.—The sick animal is in a bad way; its breathing is spasmodic, pulsations, 115 per minute. Temperature, 37°1 C. Appetite, none; dribbles freely; eyes, haggard; staggering gait; the muzzle and nostrils very pale. The urine is

* Unfortunately, in consequence of the enhanced price of experimental cattle, the series was necessarily broken.

blackish-red; the blood serum has assumed a reddish-brown tint; the blood, exceedingly clear and red on exuding from the bloodvessels, quickly darkens when in contact with the air, and the froth obtained by agitation at the time of defibrination, has a very marked yellow tinge. The animal has diarrhœa; the excrements, which are yellow on leaving the intestine, soon afterwards become russet-brown. The animal persistently lies down. The hæmatozoa are numerous in the corpuscles—20 to 25 per cent. There are scarcely 31,000 corpuscles per m.m.c. (there is often not a single corpuscle in the microscopic field). This is the lowest number I have ever observed. The blood smeared on a slide as soon as it exudes, showed well-scattered corpuscles, as if a highly-diluted solution had been made. At 10 p.m. the beast died.

Autopsy—Muscles, normal; capillaries distended with blood, very few in the connective tissue; spleen enormous, firm, and black; liver enlarged, yellowish on section; bile grumous (clotted); kidneys extremely dark, friable, capsule containing a slight yellowish œdema; urine, reddish-brown; mucous membrane of the rennet bag and of part of the intestine slightly violet-coloured; the contents of the intestines principally liquid bilious substances; blackish blood clots are found in the cœcum; some petechiæ are seen on the mucus membrane of the rectum. On the peritoneal serous membrane, which covers the digestive tube, numerous small hæmorrhagic centres are observed. The lymphatics are infiltrated, seldom with hæmorrhagic areas. The lungs are healthy. Numerous red spots are seen on the heart. On the endocardium there are also spots, but deeper and blackish. The blood reddens by contact with the air, then turns black; it forms a very attenuated clot, almost entirely fibrinous. The red blood corpuscles and those of the organs contain piriform and round hæmatozoa which are especially numerous in the cardiac muscle and in the kidneys.*

2.—VIRULENT DISEASE OF RAPID EVOLUTION, TERMINATING IN DEATH

(Plate XII.)

Bullock No. 129, Cross-bred Durham.—Age, 3 years.

On June 5th I inject into this animal, per jugular, 10 c.c. of very virulent blood. Its present temperature is 38°6 C., and I count 8,200,000 corpuscles per m.m.c.

June 6.—Temp. 39°1 C. No apparent change in the general condition of the subject; number of corpuscles, 8 350,000. An examination of the blood already reveals a few scattered *Piroplasma.*

June 7.—Temp. 38°7. There is, as yet, nothing worthy of note; the appetite is good; there is a little constipation. Number of corpuscles, 8,339,000. There is no difficulty in detecting *Piroplasma bigeminum* in the blood. The blood serum is of normal colour.

June 8.—Temp. 39° C. This slight excess of temperature does not coincide with the condition of the animal, which has undergone a great change since the previous evening. It is depressed, often lies down, eats very little; fœcal matter, scanty, very hard, reddish and streaked with blood. The muzzle and conjunctival membrane have rapidly become pale. The urine and blood serum are of a deep red colour. Respiration and pulsation have become accelerated.

The number of corpuscles has fallen to 1,829,000 per m.m.c., which amounts to a decrease of 6,500,000 corpuscles. This extraordinary decrease, occurring within twenty-four hours, is the greatest that I have ever observed in all my experience.

A great number of hæmatozoa are found in the corpuscles, and some of them are free.

June 9.—Temp. 40°4. The sick animal is now continually lying down; it takes neither food nor drink: it has diarrhœa, and its excrements are yellowish-green; the urine is reddish-brown or coffee coloured. When it is forced to rise, it stands with drooping head, the eyes widely open, the mouth full of foam; it soon lies down again. I can only find 106,950 red corpuscles per m.m.c.; the hæmatozoa are more numerous than on the previous evening; 30 to 40 per cent. of the corpuscles are infected. Many micro-organisms are free.

At 11 p.m. the breathing is much accelerated and spasmodic (jerky); the animal tries to breathe through its mouth. It stands up again, and is seized with tremors. and strikes its head against the wall. It soon falls, struggles desperately for ten minutes, and finally succumbs. This occurs about twenty-four hours after the appearance of the first symptoms.

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* I only allude briefly to the symptoms and lesions, confining myself to indicating the main features.

Autopsy.—The lesions are identical with those which were observed in the case of the last animal, with the exception that the liver is reddish-brown instead of yellowish. The articular synovia is russet-coloured. There is found in the cardiac muscle and in the kidneys an enormous number of hæmatozoa, intra-globular or free.

3.—VIRULENT DISEASE TERMINATING IN RECOVERY.
(Plate XIII.)

Bullock aged 2 years of the ordinary breed of the Province of Buenos Ayres (an immune district).

On June 9, 1899, I injected beneath the skin of this animal 10 c.c. of virulent blood

June 10.—Temp. 38°6 C. I found no hæmatozoa in the blood.

June 11.—Temp. 38° C. After a lengthened examination I finished by discovering in the jugular blood a corpuscle containing two typical piriform hæmatozoa.

June 12.—Temp. 38°7 C. The hæmatozoa are still scarce, but they are more easily detected than on the previous evening. The general condition of the animal is excellent. Number of corpuscles, 9,000,000 per m.m.c.

June 13.—Temp. 40°2 C. Notwithstanding this sudden rise of temperature, and the presence of a considerable number of hæmatozoa in the blood, some of which are free, the animal scarcely appears unwell; it feeds as on the previous day. In the evening the urine begins to show a reddish colour, and contains some albumen. The number of red corpuscles has fallen to 6,572,000 per m.m.c.

June 14.—Temp. 40°8 C. The patient is greatly diarrhœad, and the excreta greenish; the urine is red. The animal is depressed, eats nothing, and appears to be very ill.

Number of corpuscles.—Only 1,550,000 per m.m.c.; 10 to 15 per cent. are infested with *Piroplasma*.

June 15.—Temp. 39°5 C. The animal continues to be very sick. The muzzle is pale; the urine red, contains enormous quantities of albumen.

Number of corpuscles.—310,000 per m.m.c.

June 16.—Temp. 38°1 C. The animal appears to be a little better; it is weak, eats very little, constipation sets in; the urine becomes rose-tinted; in the evening it contains no longer any hæmoglobin, but still holds albumen. The number of corpuscles is 434,000 per m.m.c. The hæmatozoa are less numerous than on the previous evening.

June 17.—Temp. 38°1 C. The animal is better; it has a slight appetite. Number of red corpuscles, 433,000 per m.m.c. There are few hæmatozoa. In the blood I find a giant multi-nucleated corpuscle. The blood serum is slightly rose-coloured. No hæmoglobin in the urine.

June 18.—Temp. 39°5 C. The animal is slowly approaching convalescence. It is difficult to detect any hæmatozoa, whilst on the other hand, the giant multi-nucleated corpuscles are very numerous. Number of corpuscles, only 372,000. The blood serum is pink; the blood-clot scarcely dissolves in it.

June 19.—Temp. 38°7 C. The number of red corpuscles has risen to 502,000. The animal eats well, no longer appears sick, but still remains very weak and anæmic. Constipated.

June 20.—Temp. 38°5 C. Number of corpuscles, 600,625 per m.m.c. The blood serum is still a little pink. The urine contains albumen. I can find no hæmatozoa, but the giant multi-nucleated cells are very numerous and filled with spherical or irregular granulations, strongly stained with methyline blue. The granulations are so numerous and so minute in a given number of corpuscles, that the latter are stained completely blue, and a mere superficial examination would lead to the belief that they were white corpuscles.

June 21.—Temp. 38°6 C. The number of corpuscles has abruptly risen to 3,089,000. The giant cells are still numerous. There is a considerable number of small red corpuscles. The excreta begin now to assume a normal consistency, but still retain the rusty colour.

June 22.—Temp. 38°7 C. Number of corpuscles, 3,263,000. The general condition of the animal shows visible improvement. There are no *Piroplasma* in the blood; many small corpuscles and also an equal number of giant multi-nucleated cells are perceptible. Serum still pink.

June 23.—Temp. 38°5 C. Number of corpuscles, 3,348,000.

June 24.—Temp. 38°4 C. Number of corpuscles, 3,131,000. Giant cells still present, but no *Piroplasma*.

June 25.—Temp. 38·7 C. Number of corpuscles, 3,627,000. The mucous membranes and the muzzle are not so pale. The animal is recovering strength. The

blood, taken on the 22nd, shows a very red serum and a soft clot, whilst the blood of a healthy animal, taken under the same conditions, has a citron-yellow serum, and the clot is firmer. In bovine malaria, the hæmoglobin is, for a considerable time, scarcely held by the corpuscles.

June 26.—Temp. 38°7 C. Number of corpuscles, 3,557,000. I find a type of hæmatozoa. More multi-nucleated cells.

June 27.—Temp. 38°9 C. The giant cells diminish visibly in quantity. The size of the corpuscles becomes uniform. The serum is of normal colour.

June 28.—Temp. 38°6 C. The animal is progressing well.

June 29.—Temp. 38°5 C. Number of corpuscles, 3,999,000. In a red blood corpuscle I meet with a hæmatozoa. The urine still retains a little albumen.

June 30.—Temp. 38°6 C.

July 1.—Temp. 38°8 C. Number of corpuscles, 4,216,000. The size of the corpuscles tends more and more to become uniform; there are several small ones.

July 2.—Temp. 38°5 C. Number of corpuscles, 4,092,000. A very small quantity of albumen in the urine.

July 6.—Temp. 38° 6 C. Number of corpuscles, 5,642,000. All the corpuscles have assumed a uniform size. There are no hæmatozoa.

July 12.—Temp. 38° 7 C. Number of corpuscles, 5,642,000. No albumen in the urine.

July 23.—Temp. 38° 6 C. Number of corpuscles, 6,618,000. The animal has put on as much flesh as before the experiment; its health appears to be excellent.

August 15.—Temp. 38°7 C. Number of corpuscles, 7,200,000.

4.—MILD FORM OF DISEASE WITH RELAPSE.

(Plate XIV.)

Cross-bred Durham Bullock.—Age, 2½ years.

On the 24th May, 1899, this animal was injected in the jugular with 20 c.c. of blood of a convalescent beast.

Up to the 30th no change was observed. Temp. 39° C.

May 31.—The temperature rises to 40°8 C., but the general condition is normal.

June 1.—Temp. 40°3 C. A slight depression and constipation are observed; still, the animal feeds and ruminates well. The urine is not red. Number of corpuscles 8,029,000 per m.m.c. Hæmatozoa very rare.

June 2.—Temp. 40°2 C. Condition still the same. Number of corpuscles 6,050,000. The hæmatozoa are slightly more in evidence.

June 3.—Temp. 39°4 C. I observe a sensible improvement. The number of corpuscles has fallen to 4,900,000. There are few hæmatozoa; no hæmoglobin in the urine. The appetite is good.

June 4.—Temp. 38°8 C. Badly constipated; excreta chocolate-coloured. The number of red corpuscles has again slightly diminished: 3,700,000. The urine contains a little albumen; no hæmoglobin. There are not many hæmatozoa in the blood.

June 5.—Temp. 39°5 C. The patient is convalescent. The number of corpuscles begins to increase: 3,782,000. Few hæmatozoa. Giant multi-nucleated cells appear. The animal is observed to have become somewhat thin. The appetite remains good, the constipation is easier. Still no sign of hæmoglobinurea.

June 10.—Temp. 38°9 C. Number of corpuscles, 4,929,000. No hæmatozoa.

June 19.—Temp. 38°7 C. Number of corpuscles, 6,510,000. No sign of giant multi-nucleated cells; no hæmatozoa in the red blood corpuscles. The restoration of the blood proceeds very rapidly.

June 28.—Temp. 38°4 C. Number of corpuscles, 6,355,000. After a long search I discovered two corpuscles infested with piriform hæmatozoa. No multi-nucleated cells are observable. The appetite and general condition are good.

July 1.—Temp. 38°7 C. No hæmotozoa in the corpuscles. Under the microscope, the blood has the appearance of that of healthy animals; the corpuscles are all of the same size.

This animal is always under observation. Its temperature is taken and blood drawn every day. From 1st to 10th the temperature remained normal; yet the animal has a very capricious appetite. On the 12th its temp. was 39°9 C. I suspect it has had a relapse.

July 13.—Temp. 38°5 C. I find many nucleated cells in the blood, a certain sign of fresh anæmia. In fact, the number of corpuscles now only reaches 3,286,000. This anæmia must have supervened slowly, for the animal's urine has never been red. I perceive no *Pirosoma* in the corpuscles.

July 18.—Temp. 38°7 C. Number of corpuscles 4,310,000. The animal is progressing well.

July 23.—Temp. 38°4 C. Number of red corpuscles, 5,600,000.

July 30.—Temp. 38°7 C. Red corpuscles, 6,700,000. One corpuscle contained two hæmatazoa.

August 4.—Temp. 38°3 C. Red corpuscles, 7,150,000. There are still a very few red, multi-nucleated corpuscles. This bullock is doing very well.

ATYPIC FORMS.

5.—VIRULENT ATYPIC FORM TERMINATING IN DEATH.

(Plate XV.)

Bullock of no particular breed.—Age, 3 years.

On the 26th October, 1899, I injected into the jugular of this bullock ¼ c.c. of emulsion taken from a kidney from an animal which had died a natural death. Temperature 39° C.

October 27.—Temp. 39°3 C. Red corpuscles, 8,1000,000 per m.m.c.

„ 28.—Temp. 39°2 C.

„ 29.—Temp. 39°2 C.

„ 30.—Temp. 39°5 C. So far, the subject has remained in health, the examination of the blood showing nothing abnormal.

October 31.—Temp. 40°4 C. The general condition is good, but the appetite diminishes.

November 1.—Temp. 40°9 C. The animal appears sad and depressed; has scarcely any appetite. There is no hæmoglobin in the urine, nor do I observe any hæmatozoa in the blood.

November 2.—Temp. 41°2 C. The animal no longer eats. It visibly loses flesh, and yet the blood shows no trace of hæmatozoa. There is no hæmoglobin in the urine. Number of corpuscles, 8,050,000.

November 3.—Temp. 41°1 C. It is still impossible to find a single hæmatozoa in the corpuscles. The colour of the urine is normal.

November 4.—Temp. 41° C. The animal takes no food. It is exceedingly emaciated, its flanks are very hollow. For hours it remains standing, the head sunk, the eyes haggard, and foams at the mouth. Towards 5 p.m. it is seized with a violent trembling, which convulse it at shorter intervals. Shortly afterwards there occurs an emission of urine, slightly reddish, owing to the presence of hæmoglobin, and containing a large quantity of albumen. When the animal is forcibly compelled to move, the hindquarters waver, and the carriage of the head presents that special stiffness alluded to in the article on symptoms. The excreta are liquid, yellowish at first, then of a rusty colour; 75 respirations and 120 pulsations per minute may be noted. The red corpuscles number 7,100,000 per m.m.c. in the morning, and in the red corpuscles it is difficult to find a few scattered intra-corpuscular hæmatozoa of remarkably small size.

November 5.—Temp. 40°9 C. The number of corpuscles has fallen to 4,464,000; the urine is bright red. The animal appears to be at the point of death; ever since the morning it has struck its head against the wall, struggles to breathe, and appears totally indifferent to its surroundings. More infested corpuscles are found in the blood than could be detected on the previous night, but the number is still restricted. At 4 p.m. the animal died.

Autopsy.—The muscles are normal. The mucous membrane of the digestive canal is slightly reddened; towards the end of the cœcum there are blood clots. On the peritoneum there are some petechiæ. The intestinal lymphatics and sub-lumbar regions are somewhat hypertrophied, infiltrated, and hæmorrhagic. The spleen is firm, moderately hypertrophied with a black pulp. The liver is of a violet-brown colour, the bile clotted and dark, less abundant than usual. The kidneys are covered with an enormous hæmorrhagic œdema; they are dark-brown, friable, and much congested. The urine is bright-red. The pancreas is very much reddened. Nothing abnormal is noticed in the lungs.

The heart has only a few hæmorrhagic spots on the surface; on the other hand, there are many on the left endocardium. The colour of the cardiac muscle is almost normal. The blood coagulates and reddens quickly when in contact with the air; at first sight it is not clear, as we have seen in other virulent cases. A large number of round hæmatozoa are found in the kidneys examined immediately after death, and many begin to form spores. Elsewhere, that is to say, in the cardiac muscle, the spleen, the liver, the pancreas, the blood, there are few hæmatozoa; there are still fewer in the marrow, in the thyroid body, and in the lymphatic glands. All the hæmatozoa found were rounded in form, although the examination was made immediately after death.

It will thus be seen that the pear shape is not always found in the carcass.

Two more Cases of Experimental Disease of the Atypic Form

On the 5th October, 1899, I inoculated two beasts (Nos. 111 and 164) in their veins with ¼ c.c. of a kidney emulsion, very rich in round hæmatozoa, taken from an animal which had died rom the results of a sub-cutaneous inoculation of blood from a bullock affected with natural malaria. I must observe that the beast affected with the natural malaria and the first control, had both developed the atypic form of the disease; I therefore had a right to expect that I should observe the same form in the newly inoculated animals. And this is indeed what happened.

I give here the summary of the two observations:—

Bullock No. 111.

October	6.—	Temperature,	39° C.	8,300,000 red corpuscles.
,,	7	,,	38°8 C.	No hæmatozoa in the blood.
,,	8	,,	39°1 C.	,, ,, ,, ,,
,,	9	,,	39°1 C.	,, ,, ,, ,,
,,	10	,,	38°4 C.	8,400,000 red corpuscles.
,,	11	,,	38°2 C.	No hæmatozoa.
,,	12	,,	38°8 C.	,, ,,
,,	13	,,	39°2 C.	,, ,,
,,	14	,,	39°6 C.	,, ,,
,,	15	,,	40°2 C.	8,050,000 red corpuscles; no hæmatozoa.
,,	16	,,	40°1 C.	No hæmatozoa.
,,	17	,,	40°6 C.	,, ,,
,,	18	,,	40°3 C.	7,700,000 red corpuscles; no hæmatozoa in the jugular blood.

On the 18th this animal was very sick; since the 15th it had eaten very little, and became slightly emaciated. I had it killed

Autopsy.—The blood apparently normal; no change in the corpuscles; in spite of long-continued careful examination, I was unable to detect any hæmatozoa in the jugular blood.

The spleen is barely one-half larger than the normal size.

The liver is healthy; the bile, small in quantity, is normal

The kidney, reddened; the urine has never contained any hæmoglobin, is of normal colour, and without albumen. The intestines, the lymphatics, the lungs, and the muscles exhibit nothing unusual.

Very few hæmatozoa are found in the kidney, and those few in the shape of very small *Piroplasma;* in the muscles of the heart there are remarkably few. I see none in the liver, nor in the spleen.

The small number of micro-organisms found at the *post-mortem*, compared with the intensity of the symptoms and the insufficiency of the lesions, furnish a good example of the power of the hæmatozoic poison.

Bullock No. 164.

October	6.—	Temperature,	38°7 C.	8,500,000 red corpuscles.
,,	7	,,	38°5 C.	No hæmatozoa in the blood.
,,	8	,,	38°2 C.	,, ,, ,, ,,
,,	9	,,	39° C.	,, ,, ,, ,,
,,	10	,,	38°4 C.	8,700,000 red corpuscles.
,,	11	,,	39° C.	No hæmatozoa.
,,	12	,,	39°2 C.	,, ,,
,,	13	,,	38° C.	,, ,,
,,	14	,,	39°2 C.	,, ,,
,,	15	,,	39° C.	8 300,000 red corpuscles.
,,	16	,,	39°6 C.	No hæmatozoa in the corpuscles.
,,	17	,,	40°4 C.	,, ,, ,, ,,
,,	18	,,	40° C.	8,200,000 red corpuscles; no hæmatozoa.
,,	19	,,	40°6 C.	Nothing in the corpuscles.
,,	20	,,	40°6 C.	,, ,, ,,
,,	21	,,	39°2 C.	8,200,000 red corpuscles; no hæmatozoa in the blood.
,,	22	,,	39°4 C.	8,200,000 red corpuscles.
,,	23	,,	38°3 C.	8,400,000 ,, ,,
,,	24	,,	38°7 C.	8,300,000 ,, ,,
,,	25	,,	39° C.	8,500,000 ,, ,,
,,	26	,,	38°6 C.	Animal progressing favourably.

The beast lost its appetite to some extent from the 17th to 21st; otherwise there was nothing abnormal noticed; its urine was always clear, containing neither hæmoglobin nor albumen. On the 17th November it regained perfect health.

Until now, these atypic cases had not been made public. It is these especially which have caused me to hesitate so long before accepting the specific nomenclature of the *Piroplasma bigeminum*. I feared lest it might be associated with some microbe. I am convinced that the "Rindermalaria" observed by Kolle in South Africa, and which he considers distinct from Texas Fever, is only the atypic form of the latter. The mild form cannot be confounded with this atypic form. In fact, in the former, one may find, at any given moment, in the general circulation, endo-globular, piriform hæmatozoa, and a loss of red corpuscles infinitely more important than in the atypic form.

For example: We have a beast which has shown no external symptom, but whose blood contains, for four or five days, scattered piriform hæmatozoa. There are 7,000,000, 6,000,000, and even 5,000,000 of corpuscles instead of 8,000,000.

On the other hand, here is a bullock affected with malaria of the atypic form, whose temperature for the last three or four days, has risen to 40° and 41° C. It is depressed, it has no appetite, its respiration and pulsation are accelerated, and the red corpuscles of its blood number 7,500,000, 7,700,000, or even 8,000,000 without any hæmatozoa in the jugular blood. These are, then, two quite different forms of the disease.

I might have multiplied the examples of experimental transmission of bovine malaria; the cases cited seem to me, however, quite sufficient to demonstrate all the difference of the clinical symptoms and the anatomo-pathological lesions in the virulent, mild, typical, and atypical forms.

I have, as have Smith and Kilborne, retained the names "virulent" and "mild" disease, contrary to the usage of most of the authors, who only recognise an acute and a chronic form.

This latter distinction is inaccurate, since all acute cases which do not end in death, are followed by this anæmic phase, *which is incorrectly called the chronic form.*

In the virulent forms, the hæmatozoa may, as I have pointed out, appear in the blood twenty-four hours after inoculation. Usually the temperature rises a little before the first symptoms make their appearance. The corpuscular destruction occasionally attains to a degree, and proceeds with a rapidity until now unknown. In the cases which terminate in a cure, the corpuscular reparation is slow.

On the contrary, in the mild sickness, the corpuscular destruction is always rather slow; it never causes the number of red corpuscles to number less than 3,500,000 per m.m.c., and the reparation is rapid. In thoroughly mild cases, the corpuscular loss reaches scarcely to one or two millions.

I think it well to repeat that if, in my experiments, I have usually used strong doses, I have also caused death with less than one-twentieth of a cubic centimetre.

PROPAGATION OF THE NATURAL DISEASE.

The Function of the Tick.

For a long time a parasite—the tick—has been credited with being the cause of the propagation of bovine malaria.

It is Smith and Kilborne again who have been the first to definitely establish this *rôle* of the tick by very numerous and very precise experiments.

In the Argentine Republic, I found, on my arrival, that the cattle-breeders were divided into two opposing camps—some believed in the influence of the ticks, others formally denied it. And, in fact, under certain circumstances, the function assigned to these insects appeared difficult to admit, and eventually the water, the damp pastures, and the swampy prairies were incriminated. The disease might also have been produced by agencies other than the *Ixodes*.

I have consequently sought to exactly define the function of the ticks, and to consider if there were not a possibility of malarial infection from other causes.

It will be seen that my researches, although subsequent to those remarkable researches of Smith and Kilborne, are not wholly devoid of interest.

EVOLUTION OF THE TICK (*Boophilus bovis*, Curtice).

I could indulge in a long dissertation on the zoologic study of the tick, but I believe that it is my duty to reserve this description for a special work. In this present work I shall confine myself solely to the points bearing directly on the disease which now occupies our attention. Besides, the photographs of some of my preparations will furnish complementary explanation.

When I made my inquiries, I had not seen the translation of Smith and Kilborne's book, in which are quoted the labours of C. V. Riley,* Cooper Curtice,† and George Marx,‡ so that, not having been able to procure these *mémoires* before this work goes to press, it will not be possible for me to speak of them now. However, Smith and Kilborne state that Cooper Curtice had observed the skin cast twice at a week's interval, before the tick was adult; they also describe other important facts which have been confirmed by my researches.

The tick is known in the Argentine Republic under the name of *Garrapata.*

It holds the following place in the animal kingdom:—

Branch	*Anthropodes.*
Class	*Arachnides.*
Order	*Acariens.*
Family	*Ixodides.*
Sub-family	*Ixodines.*
Genus	*Ixodes* or *Rhipicephalus.*

There are, in different parts of the world, many species of ticks. That species under notice has received the name of *Ixodes bovis* (Riley) and of *Boophilis bovis* (C. Curtice). Some authors cannot connect this species with the *Rhipicephalus.*

I here give the *résumé* of one of my observations, which will give an exact idea of the evolution of the tick:—

On the 8th March, 1899, I placed on a bullock several hundreds of ticks hatched out on the previous evening. They were then of a russet-brown tint. Including their proboscis, their length was 8·80 m.m.; their breadth, measured between the two posterior pairs of legs, was 0·55 m m. (Fig. 1, Plate X.) These ticks, placed on the bullock in little heaps, disappeared as if by enchantment; they melted away, so to speak. Soon they were all hidden under the hair, and started on a voyage of discovery to find a favourable spot in which to insert their rostrum—the inside part of the thighs, the testicles or the udder, the perinæum, and the inside surface of the fore-arm are the spots for which they have the greatest predilection.

The hexapodian young larvæ, whose agility, especially in very hot weather, is surprising, are at this stage well adapted to cling to, and to spread over, their host. At the extremity of each foot are two large hooks and a small sucker (air-hole). (Plate X., Fig. 4.)

The rostrum (Plate X., Fig. 2) is formed, taking it from below to above, of the maxillo-labial dart, constructed of two similar limbs set against the median line, and furnished with several rows of teeth of almost equal size, set backwards.

* C. V. Riley, *Ixodes bovis:* Bureau of Animal Industry, 1868.

† Cooper Curtice, *Boophilus bovis:* Journal of Comp. Medicine and Veterinary Archives, July, 1891, and January, 1892.

‡ George Marx, Proc. Entomological Society of Washington, II., p. 232.

When the tick is lying on its back only two rows of teeth are seen. Above, and a little to one side, are the *chelicères* (sheaths) longer than the dart and terminating in two articulated fingers—one long and delicate, with two teeth, and situated on the inside; the other shorter and stouter on the outside, and likewise furnished with two teeth.

Above the sheaths is a transparent web-like attachment, terminating in a spatula at its free end, and having on its upper surface short spines, which give it the appearance of a rasp. This sort of upper lip is in the shape of a gutter, and quite encloses the sheaths. On each side of the members mentioned there are papillæ, abundantly furnished with hair or spines.

The dorsal shield descends a little lower than the last pair of legs. On the body, which is covered with undulating streaks, are to be seen some small spines. On the back, on the median line, towards the posterior third of the body, the anus is surrounded with another web-like structure, but rounded.

The young larvæ were examined every day; they grew very quickly. On the 15th, that is to say, seven days after they had been placed on the bullock, one of them measured 1 m.m. 45 in length and 0 m.m. 80 in breadth. On the 16th some of the ticks cast their skin for the first time, and are now at the stage of *octopodian* nymphae, for now they have four pairs of legs. They also differ from the larvæ by the appearance behind the last pair of legs and on both sides of the body of a stigmatic plate surrounded by a circle of web-like appearance as described above. (Plate X., Fig. 3.)

Lastly, if we examine the proboscis, on the ventral side, we find it enlarged and on each of the barbs of the dart may be counted three rows of teeth instead of two. Measurements of the Nymphe:—

1. On first casting the skin	Length, 1 m.m. 40 Breadth, 0 m.m. 80
2. Five days afterwards	Length, 2 m.m. 62 Breadth, 1 m.m. 76.

After the first sloughing, ticks may be observed whose shield is small, and the ovoid abdomen much elongated; in others, the shield and rostra are broader, the abdomen narrower, the body covered with stronger spines, and the dimensions much smaller. I give here the measurements of one of these last nymphes, five days after the first sloughing—

Length	1 m.m. 45
Breadth	0 m.m. 70

The ticks which have performed their first sloughing fasten themselves afresh quite close to the spot to which they were first attached. Very soon, small pretty rosy rings are seen to be formed round the puncture, on the skin which is deprived of hair.

On the 22nd, the ticks begin to take on a russet-brown colour; it is still difficult to find them on the skin, unless they are very numerous. On the backs of some there are several longitudinal rays.

On the 26th, the ticks sloughed for the second time, and the sexes are then disclosed. The males come forth first, and fix themselves by their rostra on the very spot were the second sloughing was effected.

After this sloughing, the legs appear longer. The rostrum has thickened; it possesses the same characteristics as in the larvæ, but there are four pairs of teeth visible on the dart, instead of three, as in the nymph, and two as in the larva.

Dimensions of ticks immediately after the second sloughing:—

Length	2 m.m. 20 male ...	3 m.m. 25 female
Breadth	1 m.m. 40 male ...	1 m.m. 70 female

The male, which is very active, is easily recognised. At the posterior part of the body may be seen a small prolongation, which is no other than the *penis;* on the ventral side, and immediately in rear of the rostrum, is a transverse crack surrounded by a bundle of spines. The shield covers the whole upper part of the body, which is amply furnished with sharp spines.

Finally, on the ventral side, on each side of the anus, there are two longitudinal bands of the web-like material. (Plate XI., Fig. 1.)

The rostrum of the female is larger than that of the male, but the dart has still only four rows of teeth. The shield is very narrow. On the ventral surface, and immediately in rear of the rostrum, there is an *oviduct*, protected by two little webs, and surrounded, like the transverse crack in the male, by numerous little spines. (Plate XI., Fig. 2.)

A very short time after the second sloughing the male leaves the place where he was attached, and adheres afresh, his abdomen touching that of the female.

The fecundation is of short duration, and is effected during the night. The ticks, in fact, are especially nocturnal parasites, as I have very clearly established. I have not been able to seize these arachnides at the instant of copulation; but it is probable that the male inserts his penis into the vulvo-anal slit. The fecundation being completed, he retires, and spends the night searching out females of the age of puberty, and at daybreak he attaches himself afresh by plunging his rostrum into the skin of his host.

He can fecundate several females, and when he is exhausted he remains with the last, who, in increasing her size, soon restores him completely.

When the second sloughing is over, the male tick grows no more, and dies a few days after the last copulation. The female remains fixed to the spot where she underwent the second sloughing; still, if she feels uncomfortable, she also can change her location during the night. The female rapidly increases in size after the second sloughing.

On the 31st I found several females 6 m.m. long and 3 m.m. 5 broad, weighing each 0 gr. 10.

On 1st April I found two ticks which had arrived at their full development; they were quite gorged with blood. One of them was 13 m.m. long and 5 m.m. 5 broad. She weighed 0 gr. 30; that is to say, that in twenty-four hours she had sucked in 0 gr. 20 of blood. On the same day I measured a male. He was only 2 m.m. long and 1 m.m. broad.

On the following days I collected many ticks which had reached maturity fully gorged with blood. Still, I must add, that there is great variation in the evolution of ticks; heat hastens their development, whilst cold retards it. Even when the conditions of temperature are identical, there are notable variations; thus, in the experiments described above, I saw ticks, which on April 5th, had only just undergone their second sloughing.

At the time of their complete development, the female ticks are of an olive colour and much resemble a coffee bean before roasting; they are very convex on the back, slightly so on the abdomen; the rostrum appears to be very small.

When they have gorged themselves with blood, the females fall to the ground and seek a tuft of grass or some shelter under which they lay their eggs. In the experiment I am describing, the egg-laying began on the 4th April, that is to say, three days after the tick had detached itself from the bullock which had harboured it; the egg-laying lasted for four or five days.

As the tick lays her eggs, she diminishes in size. On the dorsal surface especially, there appear irregular veins, yellowish or reddish; at the end of the laying she has become flat, shrivelled, soft, and more or less yellowish or reddish.

When she is laying, all the parts of the rostrum join together. This organ separates itself completely from the dorsal shield, and buries itself in the *camerostome* (chamber), making continuous motions from front to rear, and up and down, to assist the laying. At the same time, the oviduct dilates, and allows the eggs to pass, whilst the rostrum pushes them outside, where they form a little compressed heap, covering all the anterior portion of the tick. The rostrum also appears to lubricate this cavity, formed by its various motions. Does it emit a slime for the protection of the eggs? It is very possible. The eggs average 0 m.m. 60 long by 0 m.m. 35 broad; they contain, when first laid, a mulberry-like substance.

A female may lay 0 gr. 10 of eggs; hence, in 1 centigramme, I have counted 608, which makes a total laying of 6,000 eggs. The more the tick is gorged with blood, the more eggs she lays; but even when she is scarcely swollen, she may lay some hundreds.

The hatching of the eggs began, in the experiment I am relating, on 26th April, or twenty-one days after the laying.

The eggs, at first reddish and transparent, become gradually darker and opaque; a few days before the hatching they acquire a greyish tinge. Then the young larvæ begin to come out, often dragging after them a portion of the egg-shell. These larvæ remain together for from twenty-four to forty-eight hours on the mass of eggs; some hatched, some not. Then they begin to climb the walls of the mud in which they were enclosed, or over blades of grass, when they gain their liberty, scattering in their course the remains of the egg-shells.

As we have seen, twenty-one days are needed for the complete evolution of the tick. If we add five days for laying and the twenty-one days which the eggs take to hatch out, we see that a complete generation requires, at least, forty-seven days.

But, as in the case of a host of parasites, there are considerable variations in the duration of the evolution of the tick. Thus—

I have been able to preserve, at a temperature of + 8° to + 15° C., for two months, a tick gorged with blood, without its beginning to lay. When I afterwards subjected it to a higher temperature—up to + 30° C.—she laid fairly regularly.

The eggs themselves can be preserved for a still longer time; I have kept some in the ice-chest for from four to six months without their losing their vitality.

This property enables them to live during winter.

As regards the hexapodian larvæ, which have been represented as being able to live for a long time away from their host, in reality they are less resistant than the eggs. Usually they die after three weeks; rarely do they live for one or two months, whether at liberty in the grass or enclosed in bottles. On the contrary, at a low temperature, + 4° to + 10° C., they may be kept alive much longer.

In the pastures infested by ticks it is easy to follow up the young ones. After they are hatched, they crawl about for some twenty-four hours on the eggs and remains of shells, which they often drag after them; then they climb to the tops of the grass, where they may be seen in little clusters, constantly waving their feet in the air in the hope of hooking themselves on to some favourable host.

EXPERIMENTS IN PROPAGATING BOVINE MALARIA BY MEANS OF TICKS.*

The experiment, which consists in taking ticks from a dead animal or from one affected with bovine malaria to remove them to another, is difficult to manage, because these parasites are so firmly fixed in the skin that when they are detached they leave either the whole of the mandible or part of it behind. Still, if care be exercised by removing the ticks with the help of a needle, they may be got off intact. Under these conditions I have seen them again attach themselves, even when they have already undergone the first and even the second sloughing. But the number of ticks which one can transplant is so restricted that there is small chance of communicating the disease. For my part, I have never seen any symptom of malaria supervene amongst the cattle on which I had thus transplanted some ten ticks.

Smith and Kilborne infested paddocks with ticks which, until then, had been free from them, either by scattering a great number of completely developed females or by placing cattle in them, sick or well, carrying ticks, and

* When the ticks are very numerous on animals, they cause the latter much suffering. The cattle become emaciated and occasionally die. I have seen cattle which were usually very docile, on which I had several times placed ticks, become excited and dangerous the instant they divined my intention to infect them again.

coming from districts where bovine malaria was prevalent. Then they placed healthy cattle in these paddocks, and saw them contract the disease.

I did not wish to make further experiments such as this, because there are no ticks in the province of Buenos Ayres, where my laboratory is situated, and I did not wish to create one or more centres of infection. Nevertheless, I made one experiment; but it was carried on under special conditions, and was intended rather to prove that ticks are not always dangerous, even when they come from localities where bovine malaria is prevalent. I will describe this experiment further on, because it is of *special importance.*

The propagation of bovine malaria by means of ticks is much more easy to demonstrate when young larvæ recently hatched in the laboratory are employed. Although this method of propagating the disease has been clearly demonstrated by Smith and Kilborne, and again, later on, in Australia, by Pound, no faith was placed in the results until lately, in 1898, when R. Koch made the same observations in South Africa.

I have therefore, in my turn, tried to verify the experiments of Smith and Kilborne as far as regards the bovine malaria of the Argentine Republic.

I have made some twenty experiments of this nature, of which eleven were plainly positive. The others did not furnish any visible result. I undertook the work under various conditions, making use of ticks from different localities, taken either from healthy or from affected beasts. In all cases, the eggs were laid and hatched out in small clean glass receptacles containing not the slightest particle of earth nor the least *débris* of any kind. The laboratory in which I conducted all my experiments is about 350 kilometres (218 miles) from any centre of bovine malaria, in a zone absolutely immune. (Plate XVI.) Lastly, the animals I experimented on came from the south of the province of Buenos Ayres. They were placed in stalls, and it was impossible for them to be accidentally contaminated. I will describe two experiments, one with ticks taken from an affected beast, the other with ticks from a healthy animal.

1.—MILD DISEASE PRODUCED BY TICKS TAKEN FROM A BEAST WHICH HAD DIED OF MALARIA.

Bullock, aged 2 years. Cross-bred Durham.

On the 5th June, 1899, I placed on the skin of this bullock about 300 young ticks hatched two days before, taken from mothers gorged with blood, collected in the province of Cordoba, from an animal which had died of bovine malaria on 2nd May, 1899.

June	6.—	Temperature,	38°7 C.	Number of red corpuscles, 8,300,000 per m.m.c.
,,	7	,,	38°3 C.	As on the previous day, the general condition is good; nothing in the corpuscles.
,,	8	,,	38°7 C.	
,,	9	,,	38°6 C.	
,,	10	,,	38°6 C.	
,,	11	,,	38°6 C.	
,,	12	,,	38°9 C.	
,,	13	,,	38°8 C.	
,,	14	,,	38°4 C.	
,,	15	,,	38°5 C.	
,,	16	,,	38°7 C.	
,,	17	,,	38°5 C.	
,,	18	,,	38°2 C.	
,,	19	,,	39°1 C.	
,,	20	,,	39°6 C.	
,,	21	,,	39° C.	
,,	22	,,	39° C.	

Every day I counted the red corpuscles. Their number varied a little above and below 8,000,000. None have yet contained any micro-organism. The animal is in good health.

June 23.—*I.e.*, twelve days after the commencement of the experiment, the temperature rose to 39°9 C., and by a most careful and minute examination I found a very few types of *Piroplasma bigeminum.* The animal does not appear to be very sick. The corpuscles number 7,800,000.

June 24.—Temperature, 40° C. Corpuscles 7,200,000. The animal does not appear to be depressed; it keeps up its appetite. The urine is of normal colour. Hæmatozoa are rare in the corpuscles.

June 25.—Temperature 39°. Red corpuscles 6,900,000. Hæmatozoa still rare; urine clear yellow. The animal is slightly depressed; it eats fairly well.

June 26.—Temperature 38°5 C. Corpuscles 7,000,0000. Hæmatozoa rare; urine normal. The animal is better; its appetite is good.

June 27.—Temperature, 39°3 C., 6,800,000 red corpuscles. I find no more hæmatozoa; appetite somewhat capricious. I detached several full-grown mature ticks.

June 28.—Temperature, 38°3 C. Nothing found in the corpuscles, the number of which is 7,050,000.

June 29.—Temperature, 38°6 C. The animal is doing very well.

June 30.—Temperature, 38°7 C. I collected some fifty mature ticks.

July 1.—Temperature, 38°6 C.

July 2.—Temperature, 38°8 C.

July 3.—Temperature, 38°9 C.

July 4.—Temperature, 38°7 C. The general condition of the animal is good. I reckon 8,100,000 red corpuscles per m.m.c. Since the 27th June I have not found a single hæmatozoa.

2.—FATAL DISEASE CAUSED BY TICKS TAKEN FROM ANIMALS APPARENTLY HEALTHY.

Atypic Form.

Bullock, aged 3 years. Common breed.

On May 6, 1899, I took, in the north of the province of Santa Fé, from animals apparently healthy and raised in the locality, some ticks completely developed.

These ticks were placed in small glass vessels at the laboratory temperature (an average of 20° C.). They laid their eggs on May 19. Then the bodies of the mothers were removed, and the vessels containing the eggs were placed outside, where they remained during the whole of the winter.*

The eggs hatched out during the early days of October. I took about 1,000, and divided them into two fairly equal lots. One lot was placed on a bullock—the very one which was the subject of the experiment I am about to describe—on 12th October. The other lot was pounded in a sterilised mortar, and the whole was injected without filtration beneath the skin of the second bullock. I may at once state that this last beast did not show the slightest alteration in health—nor the least symptom approaching those of bovine malaria. Two months afterwards, I inoculated it with a small quantity of virulent blood, which killed it; it was, therefore, in no respect rendered immune. I shall revert to this case further on.

Let us return to the examination of the bullock which had received the young living ticks on its back:—

October 13.—Temperature, 38°5 C. The number of corpuscles is 8,600,000.
„ 14.— „ 38°7 C.
„ 15.— „ 38°5 C.
„ 16.— „ 38°9 C.
„ 17.— „ 39° C. Number of corpuscles, 8,300,000.

The ticks have increased in size; they are now eight days old; their colour is of a greenish blue; it is extremely difficult to detect them. The general condition of the animal is good.

October 18.—Temperature, 38°6 C.
„ 19.— „ 38°7 C.
„ 20.— „ 38°5 C. Number of corpuscles, 8,500,000. General condition, good.

October 21.—Temperature, 38°9 C.
„ 22.— „ 39°4 C. I examined the corpuscles very carefully, but so far found nothing in them.

October 23.—Temp. 39°6 C. Still nothing in the corpuscles. Appetite diminished.

October 24.—Temp. 40°7 C. Number of corpuscles, 8,200,000. Nothing found in them; the urine is of normal tint. There appears a roseate halo round the punctures made by the ticks on those parts where the skin is thin and deprived of pigment. The animal eats very little.

* I would state that in South America the seasons are reversed in regard to Europe.

October 25.—Temp. 41° C. Number of red corpuscles, 7,900,000. With the most extreme care I make a search in several preparations of blood without finding a single hæmatozoa The appetite has quite gone; the animal wastes visibly away; it has an air of sadness, of depression. The urine is of normal colour.

October 26.—Temp. 41°5 C. Corpuscles, 7,900,000. The animal eats nothing and is emaciated; the urine is of normal colour.

October 27.—Temp. 41° C. In the morning there are 7,900,000 red corpuscles; in the evening 6,900.000. The urine appears very slightly discoloured with a red tinge; it contains 2 grammes of albumen per litre (30·866 grains Troy to 1·76 pint). In the blood drawn in the morning I find no hæmatozoa; in that taken in the evening I find a very few *Piroplasma* The animal is thin, the flanks are hollow, it persistently lies down. When standing it hangs its head, the eyes are staring, foam issues from the angles of the lips. It is weak in the hind-quarters. Since the 24th instant the breathing and pulsations have become accelerated.

On the 28th the animal died towards 5 a.m., so that I was unable to count the corpuscles. Still, according to my experience, the blood, which was deep in colour, fairly thick, coagulating well and reddening by exposure to the air, cannot have lost a very large number of red corpuscles since the previous evening. The urine contained in the bladder was of a bright red colour.

Autopsy.—The lesions of the abdominal cavity are remarkable. In the peritonæum are found two or three litres (3·52 or 5·28 pints) of a jaundiced serosity. On the surface of the intestine there are numerous petechiæ, and on the duodenum, the kidneys, and a part of the colon, there is a thick reddish-yellow œdema. The intestinal mucous membrane, from the rennet-bag to the rectum, is violet-hued in places; in the cœcum there are clots of blood. The excreta are jaundiced, becoming brown when exposed to the air. The kidneys are congested, increased in size, friable. The histological examination here shows lesions of parenchymatous nephritis. I have already stated that the urine is bright-red. The liver, on section, shows a yellowish-brown hue. The gall-bladder contains a fairly large quantity of bile, a little clotted. The spleen is about two and a-half times its normal size, its substance (pulp) is black and hard. The pancreas is congested; the lymphatic glands, especially the mesenteric, are infiltrated, studded with red dots or even with large hæmorrhagic areas.

The lungs are normal. On the heart may be seen fairly numerous red spots, and on section, the endocardium appears to have blackish, hæmorrhagic areas.

The colour of the muscles and of the fat is normal.

Microscopic Examination.—The hæmatozoa in the blood are few and rounded; they are far more abundant in the kidney and in the cardiac muscle where they are found under the rounded form. In the liver and spleen it was difficult to detect them. The pear-shape was not found, although the autopsy was made shortly after death.

This case is of interest for more than one reason. It shows, at one and the same time, the infectious properties of the young ticks, the length of time during which they will preserve these properties—five months in my experience—and, lastly, the possibility of inducing malaria by means of ticks taken from animals to all appearance in perfect health. R. Koch, in his experiments, only obtained positive results from ticks taken from diseased animals, whilst those taken from healthy ones had no effect in inducing malaria.

Smith and Kilborne, on the other hand, succeeded in producing infection by means of ticks taken indifferently from healthy or diseased beasts. It is their conclusion, then, which I now confirm. It should be observed, also, that in the two cases here given, the bullock which had received the oldest ticks was precisely the one which died, whilst the animal which was infested with fresh ticks, taken from an animal very virulently diseased, had the mild form of the disease.

R. Koch, in his experiments, has enunciated the hypothesis of an attenuation of the virus in fourteen days under an African sun. This is not the case. Many a time I have proved the same fact respecting attenuation as announced by Koch, with ticks recently hatched out, and which had not suffered in any way. It is rather a question of quantity, and perhaps of quality, of the ticks and of the spores.

In conclusion, it must further be remarked that in this experiment the animal dies at the precise moment when the ticks cast their skin for the second time—that is to say, when they are still very small and most difficult to detect.

In all my experiments, the period of incubation has averaged from seventeen to eighteen days—the shortest time was twelve, and the longest twenty-eight days. The last period would seem to be quite exceptional. This period of true incubation must not be confounded with the time which may elapse between the arrival of the cattle in an infested zone and the appearance of the disease, because these animals may remain for a longer or shorter time free from ticks.

STUDY OF THE PARTICULAR FUNCTION OF THE TICK IN THE TRANSMISSION OF BOVINE MALARIA.

We must now ask ourselves, What is the particular mechanism employed in the transmission of bovine malaria by the ticks?

Here is the problem: Ticks gorged with infected blood, left on the soil or carried to the laboratory, lay eggs which soon hatch out. The young larvæ, which crawl on the earth or under a bell glass, when transplanted on to a healthy beast, either by their own movements or by the hand of the experimenter, often induce bovine malaria. How? By what mechanism? My researches on the transformation and sporulation of the *Piroplasma bigeminum*, even if they do not furnish a definite solution of the problem, throw a vivid light on the particular agency of this propagation.

After the labours of Smith and Kilborne, of Pound, of R. Koch, and of myself, there can no longer remain any doubt concerning one main fact—viz., the ticks gorged with infected blood give birth to other ticks, which themselves are infected also.

But the infection of these young ticks, is it *endogenous*, that is to say, does it already exist in the egg which has produced them; or else, is it *exogenous*, that is to say, are these young ticks infected after being hatched from the eggs? One might well think, indeed, that the entire organism of the tick developed on a diseased animal will be infected by the spores of the *Piroplasma bigeminum;* even its eggs will not have been able to escape the infection by these spores, so that the hexapodean larva which is born of them will be equally infected, and, hence, will be able to transmit its germs to the animal which afterwards harbours it.

Unfortunately, up to the present, we are not acquainted with any process of staining which will enable us to distinguish the spores of *Piroplasma bigeminum*, amidst the enormous quantity of diverse granulations met with in the eggs, and in the bodies of the young ticks.

This hypothesis, which admits the possibility of the passage of the spores into the egg, is, however, not indispensable in order to explain the transmission of bovine malaria by means of the ticks.

In fact, when one watches the hatching of the eggs, it is seen that the larvæ do not at once quit the spot where they were hatched out. They remain there for a period of from twelve to twenty-four hours, often longer, wandering about amongst the eggs not as yet hatched, and amongst the remains of the shells. Then they end by dispersing, most generally trying to climb.

It is possible, then, that the eggs fouled on the outside by the mother, retain on their shell a certain quantity of spores of the *Piroplasma* which are quite capable of infecting the young larvæ.

What makes this hypothesis very probable is the fact of *the active intervention of the mother's rostrum during the hatching process.* It is the rostrum that casts the eggs outside the oviduct, according as they are hatched. It appears to exert a sort of rhythmic pressure on the oviduct, of which it perhaps moistens the orifice.

In walking, the larva often touches the places over which it walks with its rostrum, and particularly with the barbed dart (Plate X., Fig. 2), which is admirably adapted for collecting the spores.

If the surface of the eggs is soiled by the spores the young tick loads its rostrum with them, as it would also do in crawling over the ground soiled by

blood-soiled excreta or urine containing hæmoglobinurea. Then in puncturing a bullock in a receptive condition, it inoculates the animal with these spores and gives it the malaria.

These spores which infest the tick are, from numerous experiments, found to be *passive spores*, that is to say, they are powerless to produce the disease by inoculation. Nevertheless, if introduced beneath the skin by the tick itself, it induces the appearance of the disease.

How are we to explain this phenomenon? Two more hypotheses are still possible. Either the spore undergoes, in the tick, a new evolution, by which it receives a shape capable of invading the organism, or else, by injecting a special saliva at the instant of biting, the tick imparts to the spore, conditions exceptionally favourable to its evolution.

This last hypothesis appears to me to be the only acceptable one. In fact, if the positive inoculation by the ticks were due to a new evolution of the parasite, the sub-cutaneous injection of a mass of eggs, or of the bodies of the ticks, ought, at least occasionally, to give the bovine malaria. *But not one single one of the numberless experiments made to this end has been attended with success.* I have injected as much as 30 grammes (463 grains Troy) of ticks pounded in a mortar with sterilised water. I have also pounded up and injected ticks about to hatch out, others in different stages of their development, and, lastly, others whose evolution was complete, and which were gorged with blood, without ever once succeeding in causing a beast to contract the disease, nor in giving immunity to inoculated animals.

I call to your recollection a thoroughly demonstrative experiment, in which the inoculation with the bodies of young ticks did not produce the disease, whilst about an equal number of these same ticks, placed on the skin of another animal, caused it to contract a fatal malaria.

Injected beneath the skin, the product resulting from mashing the ticks is yet not without danger to the animal, fouled as he is by the numerous and varied microbes passing from the digestive canal of the Ixodes. In the contents of ticks recently hatched, one finds few microbes; indeed, the different media of culture often remain sterile. But, later on, if the temperature is sufficiently high (25° to 30° C.), the flora of the bacilli becomes very rich, the few microbes absorbed finding in the blood of the ticks a medium extremely favourable to their development.

Thus I have often produced, at the points of inoculation, inflamed swellings, a rather intense febrile reaction, and sometimes death. As a rule, the general symptoms show themselves during the first twenty-four or forty-eight hours, much earlier than if they had been produced by the evolution of *Piroplasma bigeminum.*

I recapitulate here the history of a bullock which had been inoculated with the eggs:—

On July 1, 1899, I took 30 grammes (463 grains troy) of tick eggs—about 1,800,000—coming from localities where the malaria was endemic.*

I crushed these eggs in a sterilised mortar, without water; I thus had a homogeneous paste, greyish-brown in colour, which I diluted in 40 c.c. of sterilised water; the brownish liquid obtained was all injected with every aseptic precaution beneath the skin of an animal whose temperature then was 38°8 C. The liquid from the sides of the mortar served for making stained preparations in which I found several common microbes.

July 2nd.—Temperature, 40°4 C. The animal is depressed, has no appetite, and is affected with severe diarrhœa. At the point of injection a diffuse tumefaction is observed,

July 3rd.—Temp., 39°5 C. Same condition as on previous evening.

July 4th.—Temp., 40°3 C. The animal is very sick. In the red corpuscles, the number of which is normal, I find nothing.

July 5th.—Temp., 37°5 C. The diarrhœa continues; rumination is suspended; the animal is emaciated; it dies on the following morning with a temperature of 37°1 C.

* Another portion of the eggs, placed on the warm chamber, produced larvæ which, placed on the skin of a bullock, communicated bovine malaria to it on the eighteenth day.

Autopsy.—The lesions found at the *post-mortem* were those of hæmorrhagic septicemia; the urine was not hemoglobinuric, and did not even contain albumen. In the kidneys, which were slightly congested, I found no hæmatozoa whatever, nor in the cardiac muscle, the spleen, or the capillaries of the mesentery. The cultures of the blood and the organs showed various microbes, especially a little bacterium not taking the stain of Gram.

All these negative results might depend upon the method of inoculation. I also tried punctures and scarifications.

The punctures were made in considerable number with needles dipped in the blood of ticks lately hatched, or in the product which resulted from their being crushed in sterilised mortars. I was very careful to disturb only the superficial part of the skin, and, after the operation, the part punctured was either rubbed or not with the product of inoculation.

Whatever precautions were taken, whatever the number of punctures, whatever the quality of the products injected, *never have I obtained a positive result.* This inocuousness of the punctures thus contaminated is probably the consequence of the special properties of the *passive* spores, since the virulent blood containing the *active* spores, injected under the same conditions, easily induces malaria. It is these experiments which have been many times repeated, also the positive results always obtained without any modification either of the hæmatozoa or of the disease in forty-two successive passages by sub-cutaneous or intra-venous injection, which have led me to reject the hypothesis of a new evolution of the spore in the body of the ticks or in the contents of the eggs, after which the micro-organisms might develop easily in the red corpuscles.

I am, on the other hand, quite disposed to admit a special action of the tick due to the deposit of a saliva or of a certain venom, analogous in its action to that of the virus of the bovine plague. (See especially Nicolle and Adil-Bey, Annals of the Pasteur Institute, 25th April, 1899.)

The puncture of the ticks, as I have been able to observe, is followed by an inflammation of the tegument which is never produced by artificial punctures more or less contaminated. Surrounding the rostrum of the tick (I have carefully noted this) may be seen quite at the beginning of the puncture, on the parts deprived of pigment, a roseate halo, replaced later on by a true inflammation of the skin with serous infiltration.

By means of the poison secreted by the tick, small in quantity, but continued to the base of the puncture, the blood becomes less resistant and the spores of the *Piroplasma bigeminum* would then find themselves in conditions favourable to their development.

To sum up my opinion of the particular *rôle* of the tick in the transmission of bovine malaria, I will say this—

The tick, in the larva stage, serves as an intermediary between the *Piroplasma bigeminum* and the beast. It conveys hæmatozoa in the form of *passive spores*, which it has received either whilst in the egg or in contaminating its rostrum after having hatched out.*

At the instant when it fixes its rostrum in the skin of an animal, it injects the spores, and at the same time its venomous saliva, the action of which favours the development of the latter.

REFUTATION OF THE OBJECTIONS RAISED AGAINST THE PART PLAYED BY THE TICK IN THE PROPAGATION OF THE MALARIA.

What we now know of the evolution of the *Piroplasma bigeminum* and of that of the tick enables us to reply, better than has been done up to the present, to the objections opposed to the part played by these Ixodes in malarial contagion. I shall only consider the principal objections.

* I admit that the two causes may exist simultaneously.

1. *Cases of malaria have often been observed in the absence of ticks.*

I have heard this theory maintained by many intelligent cattle-breeders, and at the outset of my researches it has often occurred to me to meet with infected animals without being able to discover ticks on them.

We know to-day, in a most precise manner, that the disease may begin from the *twelfth* day - that is to say, at a time when the young ticks are scarcely *1 millimetre 5 in length by 0 mm. 8 in breadth.* Now, if these ticks are not numerous, it is easy to understand how they may entirely escape notice, especially on a mere superficial examination. Long since then I have never found a case of natural malaria without ticks.

I maintain, furthermore, the possibility of the appearance of the disease after the complete development and fall of the ticks. But in this case, which is, besides, very rare, because all the ticks do not evolute at the same time, I have always found traces of punctures, and especially several male living ticks still adhering to the skin.

The long duration of the malarial inoculation explains how the disease may appear in the cold season. It is sufficient to experience a few fine days, or the unusual prolongation of the warm weather, for the ticks to hatch out late and slowly, and to infest the cattle, which will thus show symptoms of disease in the depth of winter at a time when there are, as a rule, no ticks.

2. *All animals covered with ticks do not contract bovine malaria.*

Nothing can be more true; but this observation does not prove the inocuousness of the tick. On the other hand, if it refers to animals bred in the midst of infested districts, either they have become immune in their youth, as we shall see later on, or else they have already had the malaria.

Again, since the female tick is not virulent in herself, but only through the act of a micro-organism which she carries about by accident, it might be that she is sometimes exempt.

Here arises a question of quantity and quality. How is it that some beasts, not refractory, remain for months in infested localities without being attacked?

This fact may be explained in two ways—either they are not immediately assailed by the ticks, or else, those which have effected a lodgment on the animal's skin are only slightly or not at all infectious. But let them some day afford a lodgment to ticks rich in spores: they will forthwith contract the disease. A very plain fact in the Argentine Republic is, that the geographical area of bovine malaria coincides strictly with that of the ticks. We shall see further on that it is not sufficient to transport ticks from one region to another to see them develop; it is further necessary that they should find these conditions favourable to their multiplication, otherwise they soon perish, and with them disappears all danger of the transmission of the disease.

3. *No one has yet been able to find the* Piroplasma bigeminum *in the body of ticks.*

This is due to the rapid transformation of the piriform hæmatozoa into round bodies, and then into spores extremely small and impossible to distinguish amongst all the mass of *débris* contained in the ticks. Thanks to the latest knowledge acquired, I have been enabled to find hæmatozoa in the ticks, even in the pear-shaped form. I obtain this result with the greatest ease by the following method:—

I place for three days on the skin of a receptive bullock, some ten ticks.* Sixteen days afterwards—*i.e.*, five days before they arrive at maturity—I inject into the jugular of this bullock 10 c.c of very virulent blood. On the third, fourth, or fifth day following this inoculation, the animal, which will be very sick, will have an enormous number of hæmatozoa in the blood, so that the ticks in gorging themselves with it will infect themselves abundantly.

* The number of ticks must be restricted, if one wishes to avoid the risk of imparting the disease earlier.

Collected immediately, these ticks will disclose corpuscles containing round or even piriform hæmatozoa, which one can watch to note the appearance of the spores.

4. An apparently more serious objection is that which arises from this very exact fact:—*The substance of the ticks or of the eggs injected under the skin of sensitive animals is absolutely inocuous.*

Observations and experiments have taught us, in fact, that the *passive* spores are incapable of themselves of infecting the organism by supplying *Piroplasma;* they require a special favouring cause, probably a venom.

5. *Horses, mules, asses, and sheep in certain districts are covered with ticks without its having been proved that a single case of bovine malaria has occurred amongst these animals.*

These facts are quite in conformity with the results of experimental inoculation; whatever may be the quantity or quality of the virus injected, never does sickness attack the horse, mule, ass, or sheep. *But a great number of ticks may, in sucking their blood, cause in these animals, as they do in the case of immune cattle, an emaciation so serious as to entail consumption and death.*

6. *Ticks which do not pass from a diseased to a healthy animal, cannot serve as agents of contamination.*

We know that young ticks already bear the germs of disease the moment they infest the cattle.

Furthermore, my observations have proved that the ticks can transport themselves much more easily than has hitherto been believed to be possible. The males detach themselves to seek the adult females. As soon as they have found one, they puncture the skin with their dart close to her. The females themselves move off when they find themselves in an inconvenient spot. Lastly, the ticks which have not been completely developed, and find themselves located on a dead beast, are not destined to perish on that account.

If one watches them for several days, as I have done, the large females will be seen to detach themselves first, then the males, and lastly the smaller ones. It is the nymphs and the mature females which remain the longest time before moving; some die on the spot, others cast their skin, but the majority detach themselves, and seek a new host which may then become infected.

It is especially during the night that the Ixodes make the journeys; this is in favour of the ticks. Cattle usually lie down all night—it is the reverse with the horse—so that the ticks have all the leisure needful to spread themselves over their hosts.

OBSERVATIONS AND EXPERIMENTS ON NATURAL CONTAMINATION.

How New Centres of Infection are Created.

All the observations made in the United States agree in recognising the danger to which cattle are exposed when transported from clean districts to districts infected by malaria. (The latter correspond with the hottest regions.) It is the same in the Argentine Republic, where cattle leaving the south are all the more exposed as they travel more to the north.* (Plate XVI.)

It has also been observed that all seasons of the year are not equally dangerous from a contagious point of view, in connection with malaria. As a very general rule, heat favours contamination, whilst cold reduces it or renders infection difficult. The reason is not hard to discover: It is the warm seasons which favour the development of the ticks, and nothing is better proved than the popular saying, "Tick year, Tristeza year." Still, it is not the very great heat which is most favourable for the evolution of the tick; the latter prefers a moderate and moist heat, such as occurs at the end of the summer and autumn

* It must not be forgotten that South America is in the Austral hemisphere, and that, consequently, the hottest zones are situated in the north.

—the end of February, March, and April. As a matter of fact, nothing is determined from this point of view; there are as many fluctuations as are found in the climate of a similar zone. So that in a certain year there may be many ticks in March and very few in the following year at the same period, when, for example, the ticks only appear in May. Another observation which I have often verified, and which is well known to competent breeders in the Argentine, is the influence the direction of the wind exercises on the appearance of the disease, and even on its degree of virulence. It is the hot and stormy winds which are the most redoubtable of all. Probably the reason is, that owing to the heat and the atmospheric depression, the organism is in an unfavourable condition to resist, and hence is all the more easily assailed.

It has been truly said that swampy districts are the most dangerous in respect of bovine malaria; but this disease may also exist on rich plains devoid of humidity. I have already pointed out that in sending cattle from the south towards the north, they run the greatest chance of contracting the disease. It is an experiment easily proved, which I have several times repeated in order to satisfy myself of the time necessary for the generation of the disease.

In one of these experiments, I sent to the north of Santa-Fé seventeen head of cattle raised in the southern region free from malaria.

When they arrived on 18th April, in the infected zone, the first case was observed on 5th May—*i.e.*, seventeen days after their introduction into the contaminated country. They were all taken ill, one after the other; and of the whole number eight died.

On the other hand, animals which travel from north to south remain in health.

Nevertheless, if they carry ticks with them, they *may* contaminate the Southern cattle which were free till their arrival. I say "*they may*," because this contamination is not fatal. To be so, the ticks must find conditions favourable to their evolution, otherwise they die on the spot, or only give rise to a degenerated offspring destined to quickly die out.

It is just these particular circumstances which have saved southern Argentina from the scourge, and, in particular, the large and rich province of Buenos Ayres.

Indeed, no precautions have been taken in the transport of tick-infested beasts coming from the north, either for export or for being fattened on the richer pastures of the south. And yet, so far, no new centres of malaria have been observed.

On this matter I made, during a favourable season, a decisive experiment. I had received eight head of cattle from the north of Santa Fé and two from Missiones—badly infected districts All these animals, covered with ticks, were placed in a field about 200 metres square, a field quite free from malaria, covered with small, fine grass, with fifteen southern cattle, of which several bulls were cross-bred Durhams, anæmic, and consequently eminently predisposed to disease.

These animals lived together for eighty-nine days without a single one showing the least symptom of disease. The blood was often examined and the corpuscles were counted, without finding anything abnormal. On the skin it was impossible to find a single tick; it is therefore evident that in this field they had met with a serious obstacle to their development. Several of these southern animals which had served for this experiment, when inoculated later on with blood of diseased animals, contracted the malaria properly.

It is a curious thing, but one can create *artificially*, in a thoroughly infested country, fields free from the disease.

Thus, the substitution of lucerne for the natural grass, at the same time that it constitutes an improvement from an agricultural point of view, creates also a centre free from malaria.

The reason is, that lucerne is so distasteful to ticks, that their multiplication is impossible. There are to-day, in the Argentine Republic, immense areas

sown with lucerne. I have seen lucerne fields of 3 leagues square (nearly 10 miles square = 100 square miles) belonging to one man. In these fields the cattle are born and grow up without having malaria, whilst in the surrounding country the disease claimed numbers of victims.

Unfortunately, on entering or leaving these lucerne fields to travel cattle either north or south, infested country has to be crossed, where the animals gather the ticks, which transmit the fever to them. These tick-infested cattle may again be taken to the lucerne fields and there become sick, but they do not create a home of infection, the ticks dying at once. All the mixed region (Plate XVI.) is admirably suited for these lucerne fields, of which its pastures are in great part composed.

It is quite different if tick-infested animals run in natural prairies covered with native grasses (*pasto fuerte*). Under these conditions the ticks multiply and transform the whole prairie into one vast home of malaria. I have several times observed cases of this nature.

All these observations demonstrate the danger of travelling cattle on foot in infested zones, especially at certain seasons of the year, as we have already seen.

On the map at the end of this work I have placed an itinerary representing the journey of a herd of good crossbred Durhams, sold on 1st March, 1899, from a property at Las Rosas, where there are vast lucerne fields. This herd was divided into three lots, bought by different proprietors.

The first, composed of ninety animals, was sent towards Juarez Celman, on a farm situated 85 kilometres further south. The journey lasted four days, during which the herd crossed some infested fields. On the twelfth day after arrival at Juarez Celman, one cow fell sick, quickly followed by many others in succession; there were eighteen deaths. These tick-infested animals, placed in artificial fields, did not create centres of infection; the disease claimed only those eighteen victims.

The second lot, comprising 700 bulls and cows, left San Rosas on 3rd March for Constanza, a village 225 kilometers to the north. On the seventeenth day after they left, some of them became sick. On the following days the number of sick increased, and many died. On 25th March the herd was in a deplorable condition. It arrived at Amelia, and had only three or four days more to travel. When I arrived I found, some kilometres from Amelia, about fifty carcasses covered with ticks. The autopsy and the microscopical examination left no doubt as to the nature of the epidemic. When the herd arrived at its destination the disease had claimed 220 victims. The fields of Constanza are especially composed of natural grasses, where the tick finds the best conditions for its multiplication, and the disease attacked even the cattle already there before the arrival of the infected herd.

Finally, the third lot, comprising only fifty very fine cows, were to travel to San Justo, situated 200 kilometers north of Las Rosas. The owner, who had large experience of the malaria, was careful to leave his beasts at Las Rosas from 1st March (the date of purchase) to 12th April, awaiting the end of the hot weather. During this period none of the animals sickened. Then the cows were sent by train to San Justo, where they arrived on 13th April. From the railway station to the property is a distance of about 40 kilometres, which are travelled on foot in two days.

Up to the 28th April all the cows were in good condition. They grazed alternately in the lucerne fields and in the natural prairie where the tick multiplies. On the 28th April six of the cows became ill; on the 30th two died; on 1st May, ten died; on 2nd May, five; on the 3rd, three; on the 4th, 5th, and 6th, one died each day. I performed the autopsy on the two last cases of malaria.

In all, twenty-six of these cows died, or 51 per cent., which, considering the locality, is not a very bad result. Indeed, it is no rare thing to find 60, 70, 80, and 90 per cent. of animals dying of malaria when travelled north.

IS THERE A NATURAL METHOD OF INFECTION EXCLUDING THE TICK?

One might ask, for example, if the ingestion of virulent products taken from diseased animals is capable of inducing the disease. With this object in view, I made a series of experiments, in which I fed animals with hay damped either with blood very rich in *Piroplasma*, recently taken from diseased beasts, or taken from twelve to twenty-four hours previously, or with emulsions made with all kinds of organs, such as kidneys, spleen, liver, pancreas, marrow, brain, and, lastly, with the contents of the intestines or hæmogloburinic urine. All the experiments were fruitless. Furthermore, these animals had not thus become immune.

Example.—On the 17th April, 1899, a crossbred Durham bullock, eighteen months old, kept without food on the previous day, ate, with its rations of hay, 200 c.c. of blood of a beast that died during the night, and 300 c.c. of hæmogloburinic urine.

On the 18th it had another feed, damped with blood and urine of animals which had died of malaria. The blood of the subject of the experiment was examined daily, and the corpuscles counted twice a week. For the fifty days following the commencement of the experiment I observed nothing. The temperature was constantly normal.

On the 7th October I injected $\frac{1}{20}$ c.c. of blood beneath this animal's skin. On the 14th the temperature was 39°8 C.; on the 15th, 40°3 C. In the red blood corpuscles I easily found *Piroplasma*. In the evening the urine began to turn red. On the 16th the temperature was 41°5 C. The animal was very sick, the urine almost black. Hæmatozoa were numerous in the corpuscles. The animal died on the night of the 17th October, and on autopsy being made, all the lesions of bovine malaria were found.

The swallowing of young ticks of various ages up to complete maturity has always been shown to be inactive.

Finally, we may consider the possibility of the transmission of the malaria by stinging flies, such as Stomoxes (*S. calcitrans*), Gad-flies (*Tabanus autumnalis*), &c.

I have shown how it is easy to impart the disease by piercing the skin of an animal, and by rubbing the spot with blood very rich in *piriform hæmatozoa;* hence it would be reasonable to believe in positive inoculation of the malaria by flies, and yet, in practice, not one of my observations in the field or in the laboratory has confirmed this method of transmission. It is evident that there is a great difference between the puncture made by flies and our dermic inoculation. It is necessary that at the instant the fly stings the diseased beast, its blood should contain a fairly large quantity of piriform hæmatozoa. On the other hand, when, after having stung a sick beast, the winged insect settles on a healthy beast, and buries its trunk in the skin, it inhales; whilst in our experiments, we seek to force the virulent liquid into the small cutaneous wounds.

However that may be, if I believe inoculation of bovine malaria to be possible through the agency of stinging flies, I consider it extremely rare, the more so because the Stomoxes and the Gad-flies (or horse-flies) do not possess the poison favourable to ticks. As to direct contamination by contact of healthy animals with diseased ones, without the intervention of ticks, this has never been authenticated in twenty experiments carried out with that view, whether there had been Stomoxes or not.

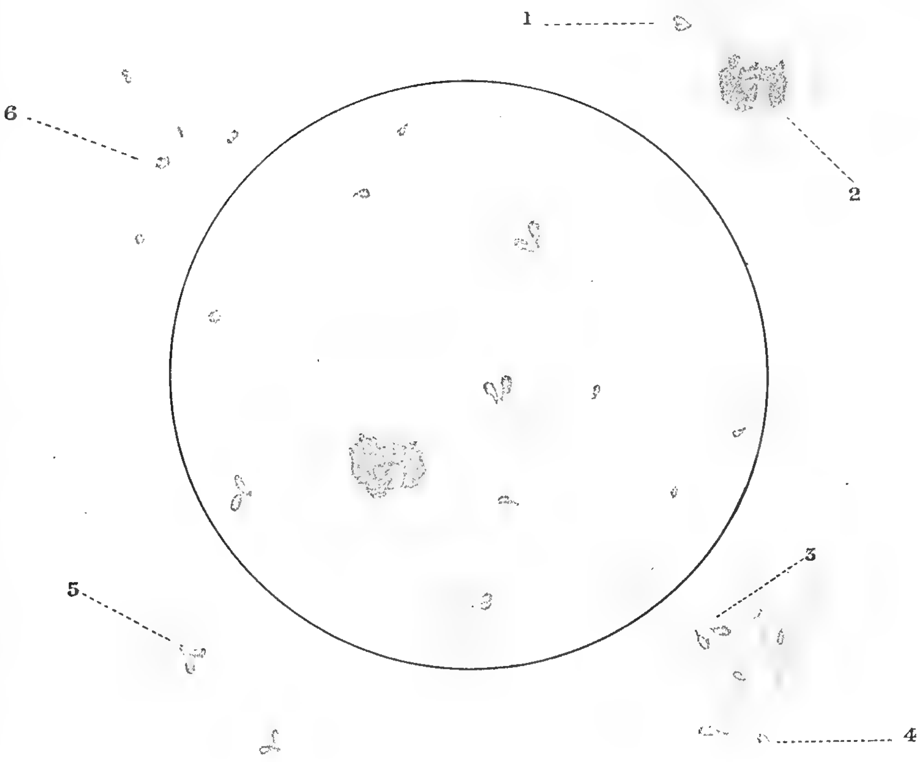
GEOGRAPHICAL DISTRIBUTION OF BOVINE MALARIA IN THE ARGENTINE REPUBLIC.

By the help of information gathered amongst station-owners who know their districts well, also from my colleague, Mr. Even, whose experience of ten years was valuable to me, and, lastly, thanks to my numerous journeys, I have tried to separate on the map of the Argentine the infested from the immune regions.

A reference to Plate XVI. will show that I recognise three zones: That of the North, where the bovine malaria exists in the endemic state; that of the

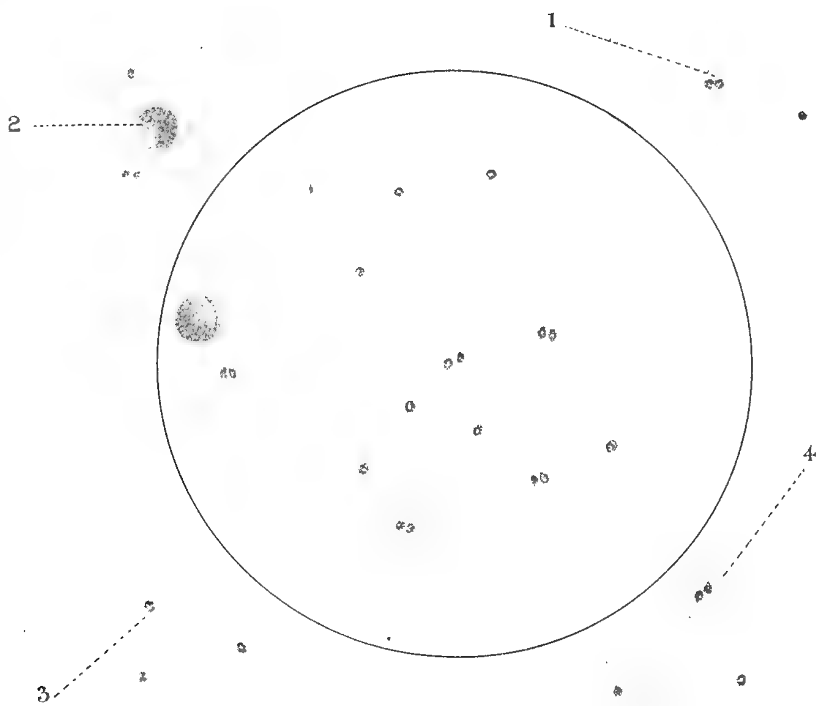
Plate I.

BOVINE MALARIA.



BOVINE MALARIA

PLATE II.



BOVINE MALARIA.

Fig. 1.

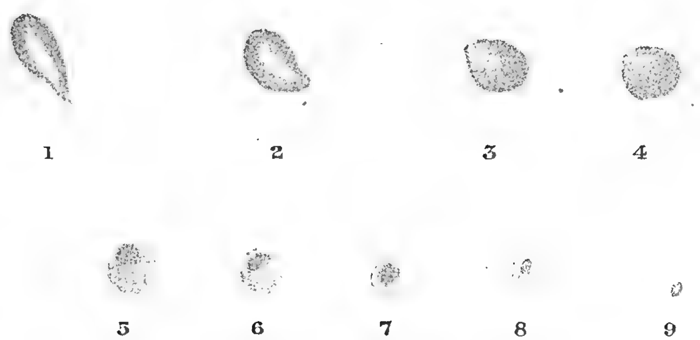
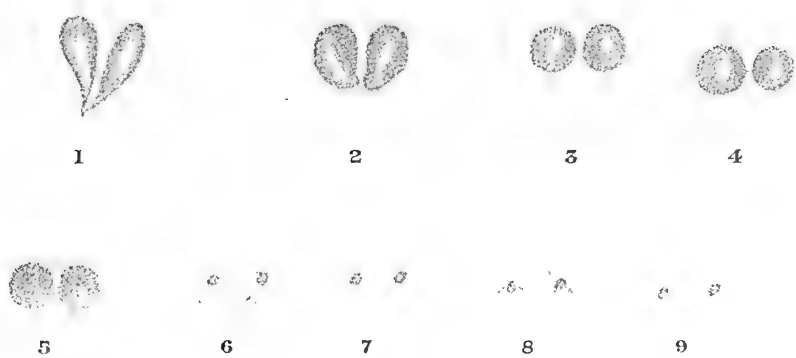


Fig. 2.



BOVINE MALARIA.

Fig. 1

1 2 3 4

5 6 7 8 9

Fig. 2

1 2 3 4 5

Plate V.

BOVINE MALARIA.

1 2 3 4

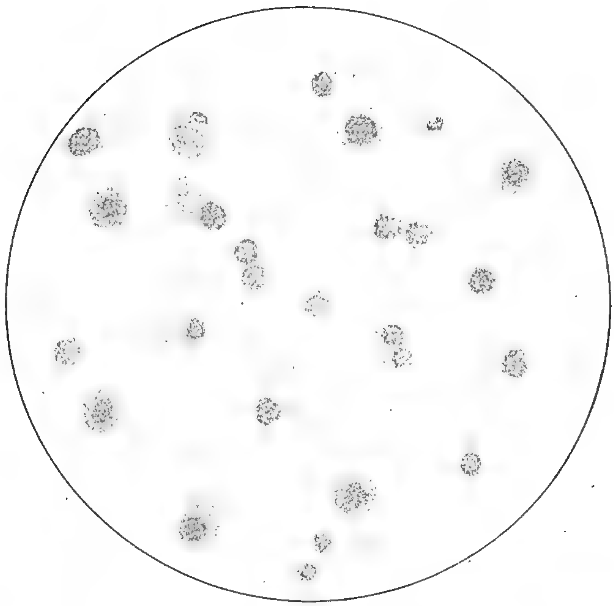
5 6

7 8

9

Plate VI.

BOVINE MALARIA.



1 2 3 4 5 6 7 8

9 10 11 12

BOVINE MALARIA.

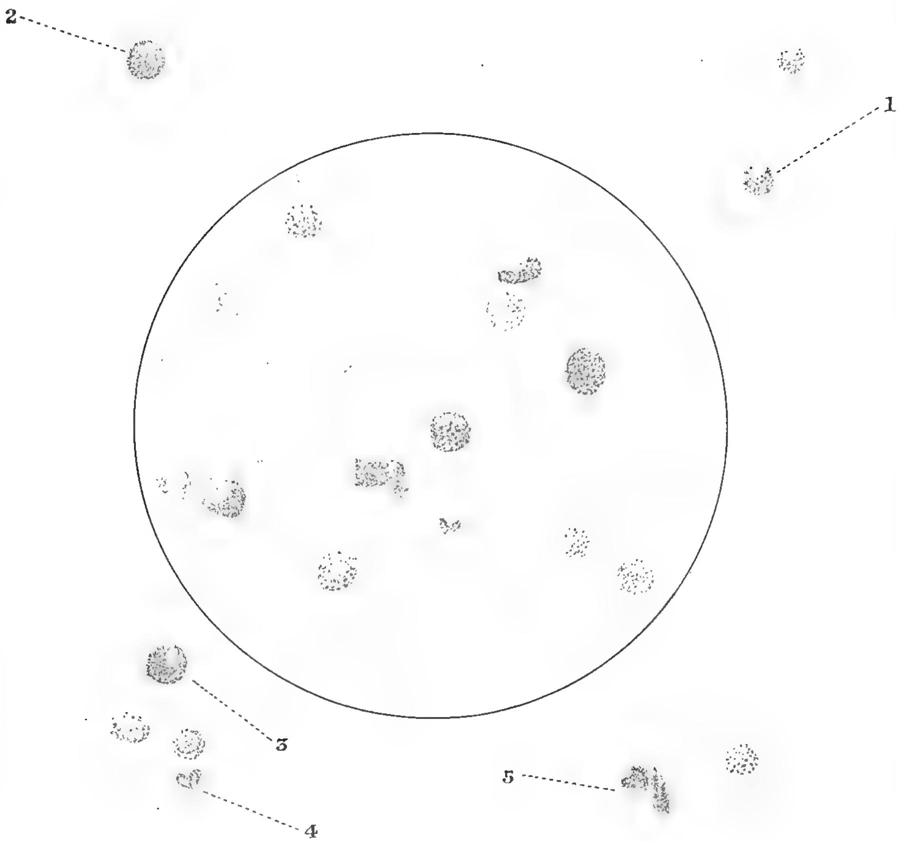
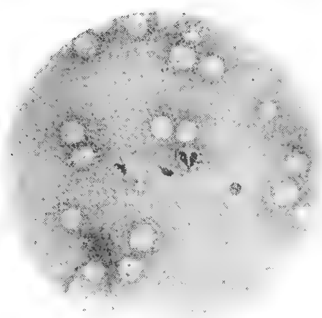


Plate VIII.



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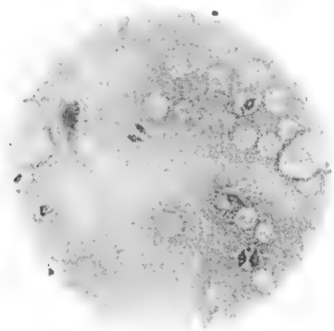

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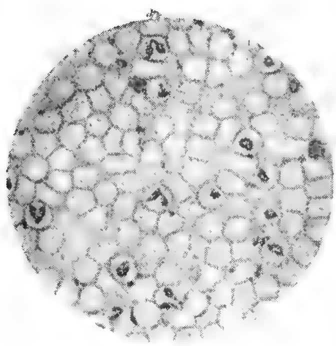

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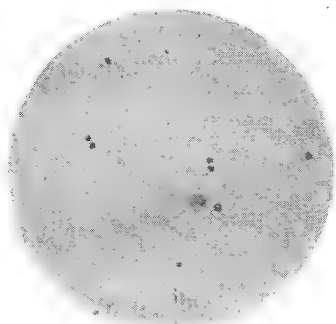

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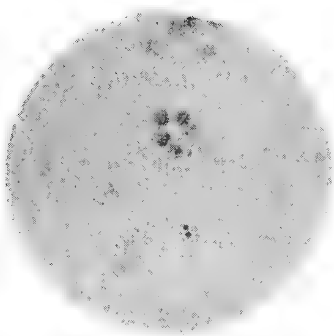

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Plate IX.

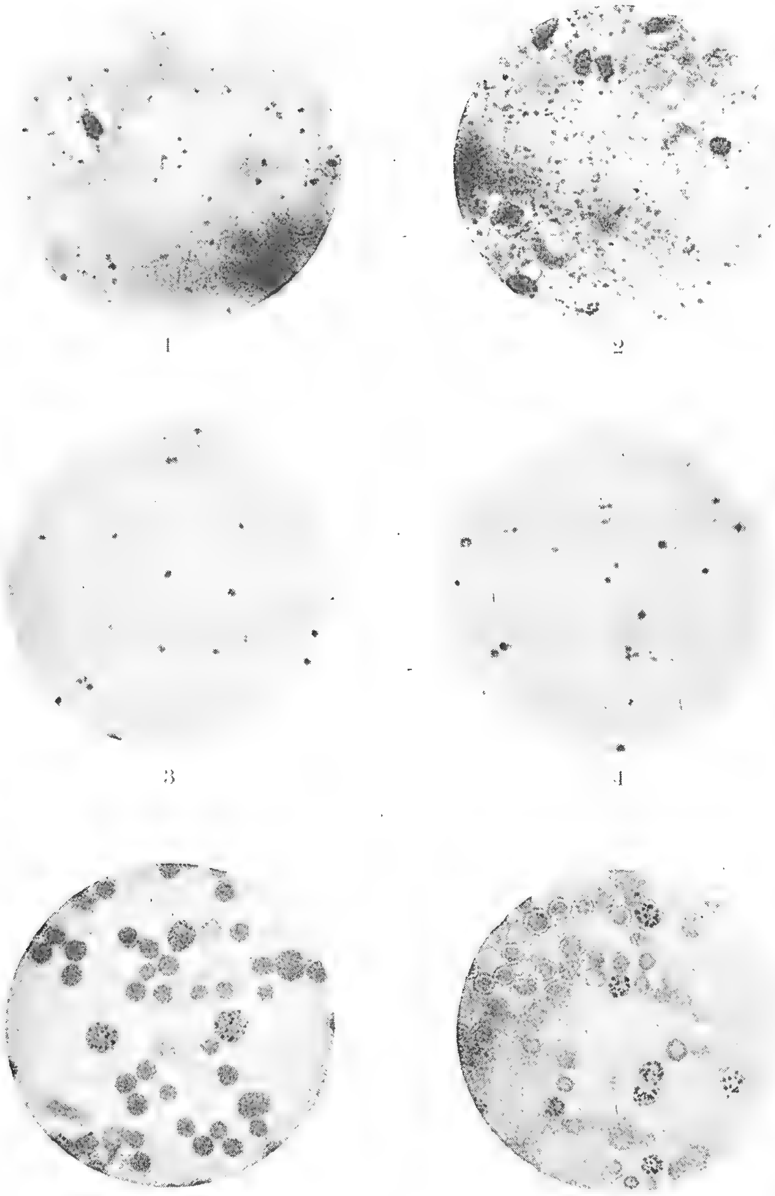
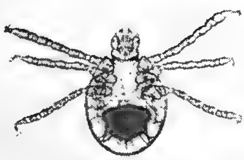


Plate X.



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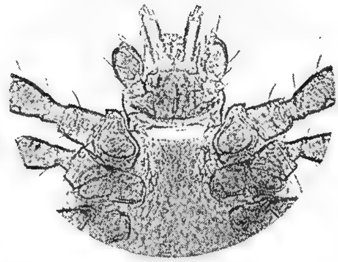

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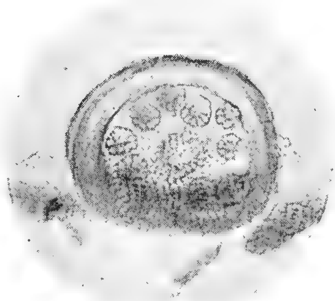

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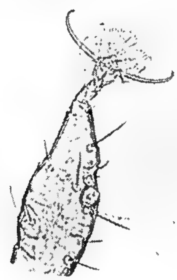

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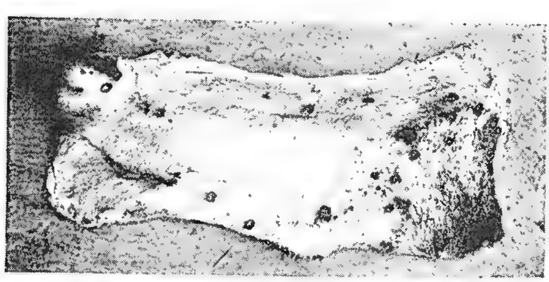

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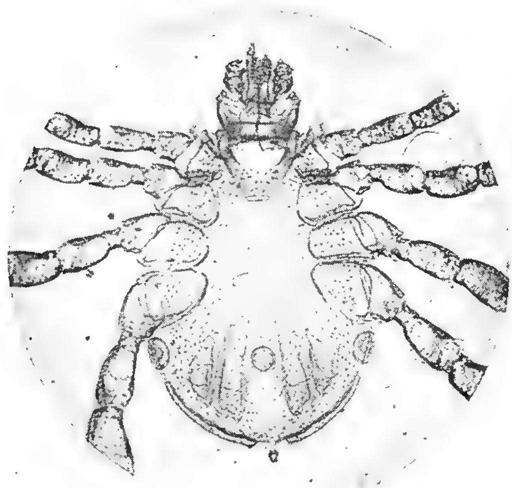
Plate XI.



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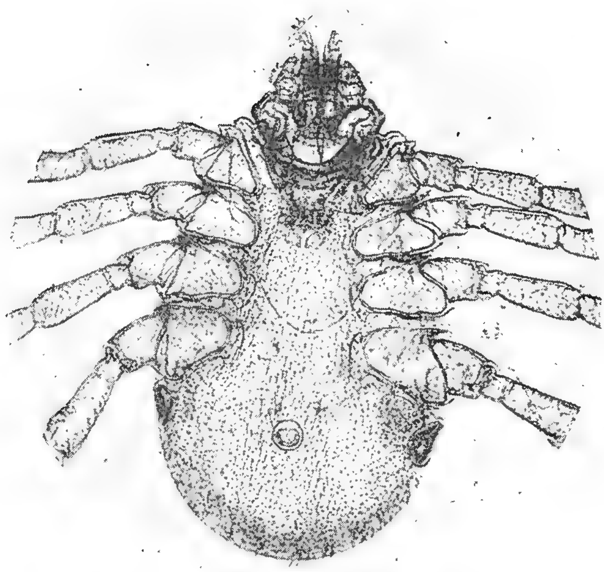
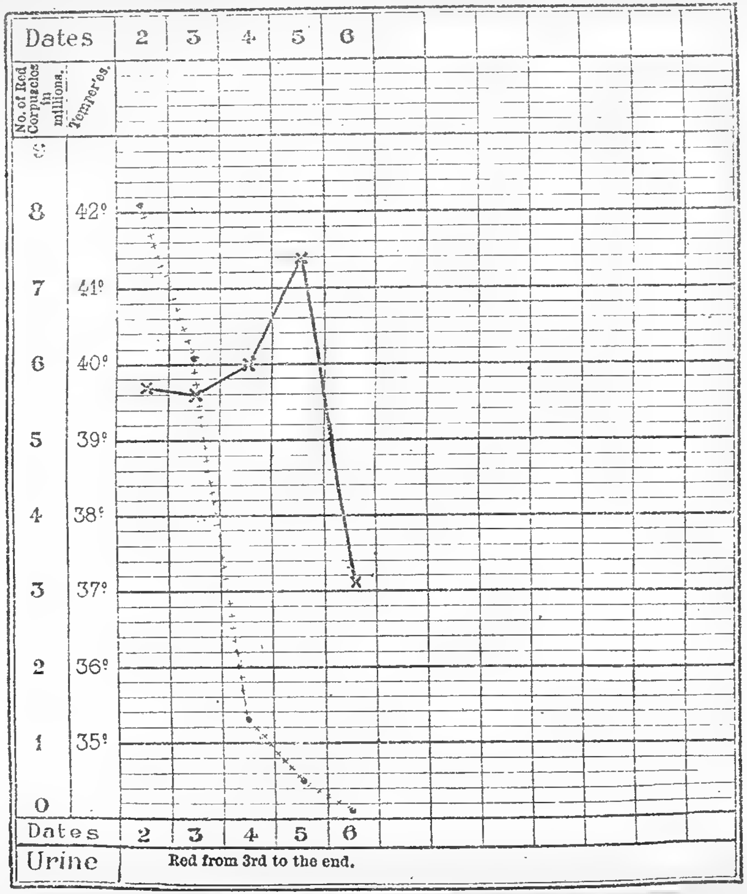


2

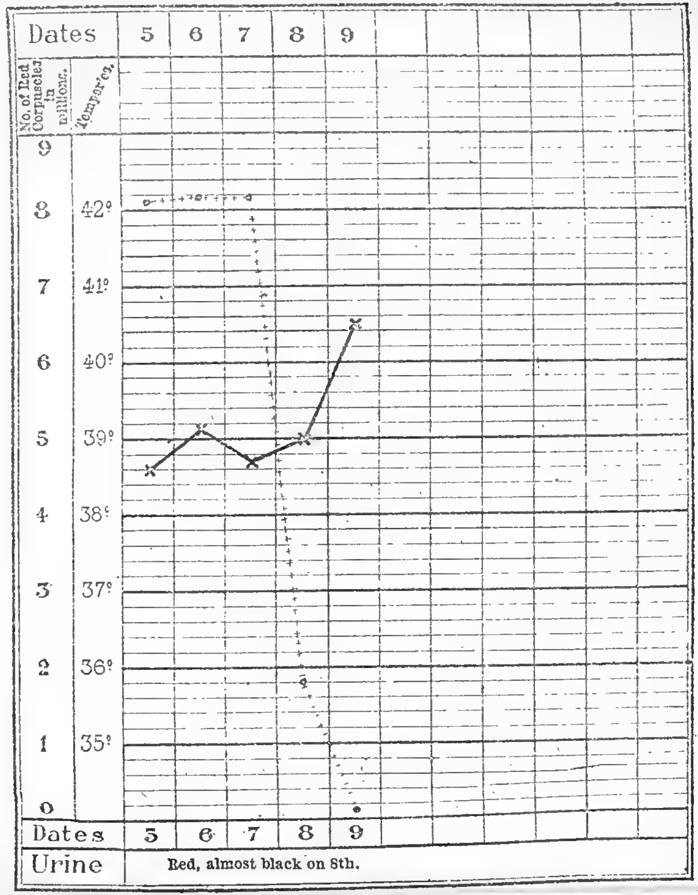
BOVINE MALARIA.

HISTORY — Temperatures. ...... Number of Red Corpuscles per m. m. c.

BULLOCK No. 108. INOCULATED JUNE 1, 1899.



BULLOCK No. 129. INOCULATED JUNE 5, 1899.



BULLOCK No. 114. INOCULATED JUNE 9, 1899.

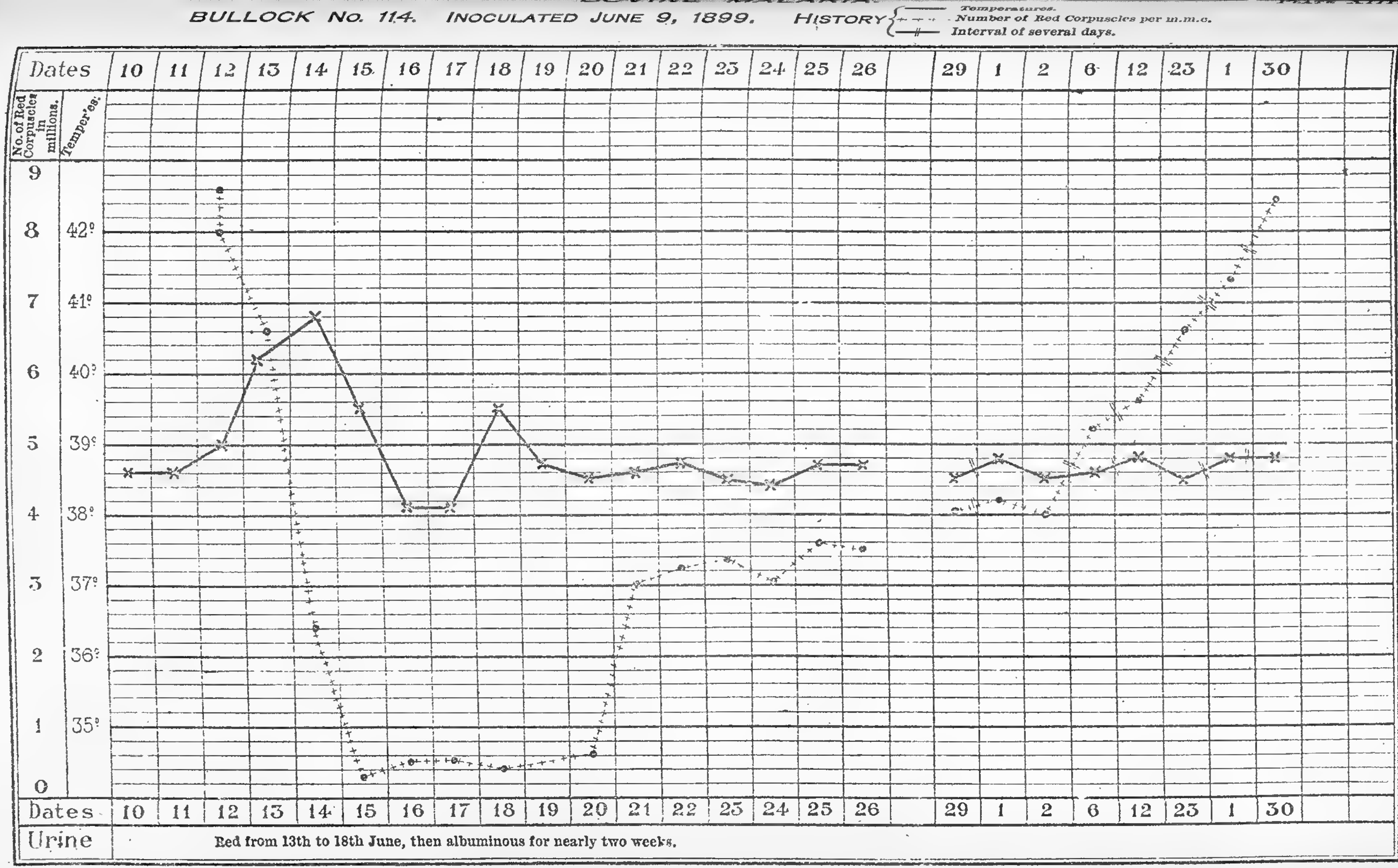
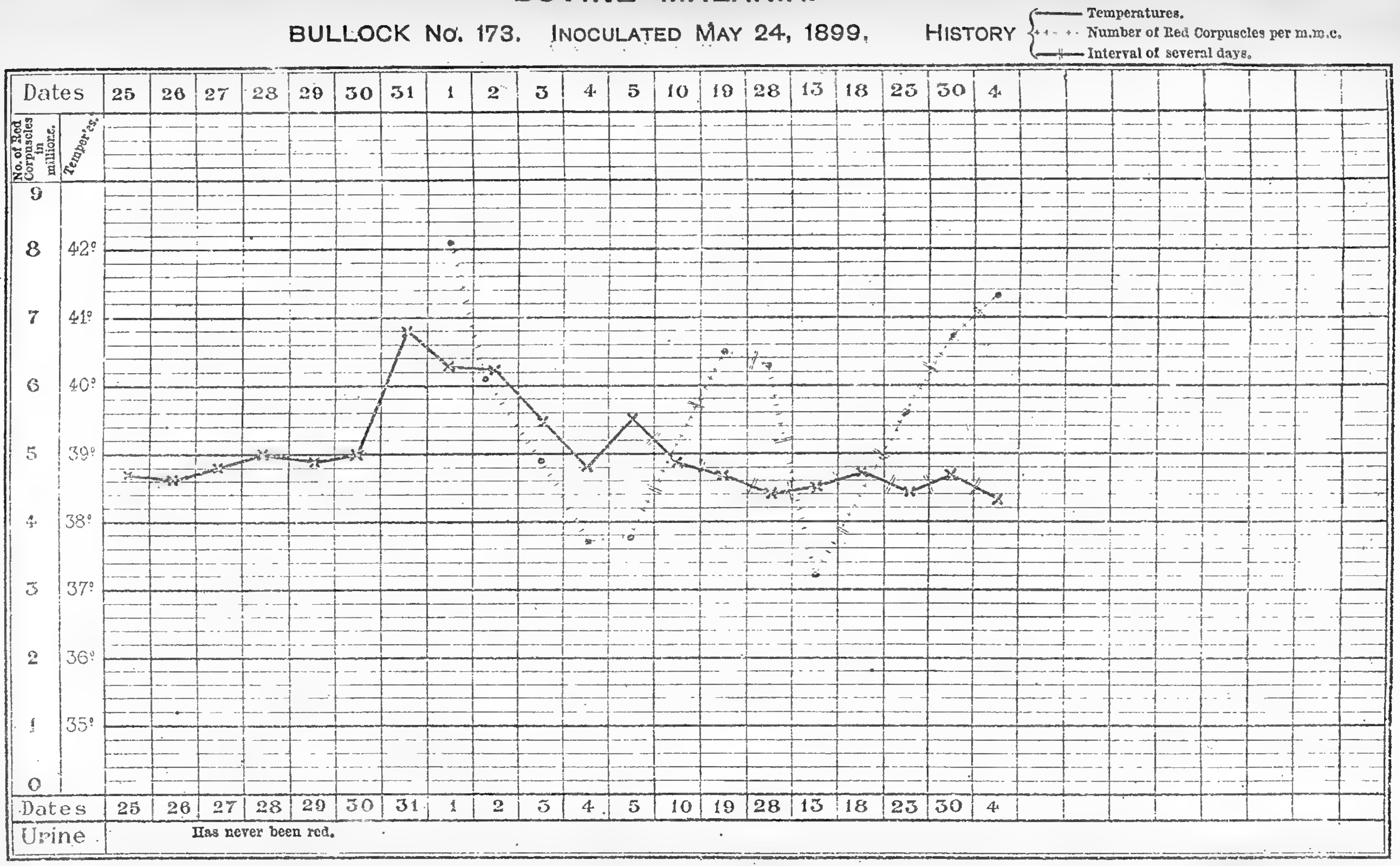
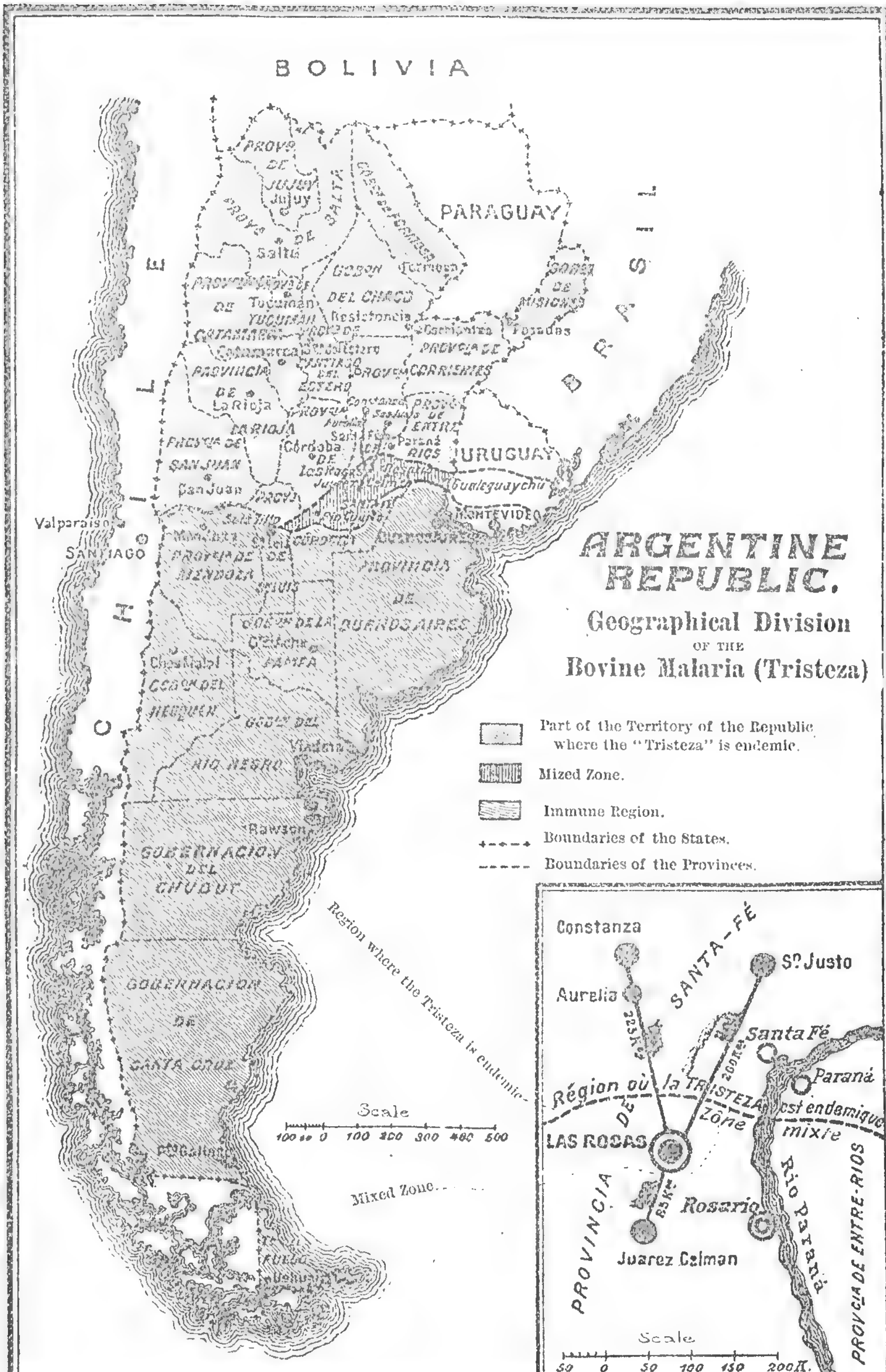


PLATE XIV.

BOVINE MALARIA.

BULLOCK No. 173. INOCULATED MAY 24, 1899. HISTORY




ARGENTINE REPUBLIC.
Geographical Division
OF THE
Bovine Malaria (Tristeza)
Part of the Territory of the Republic where the "Tristeza" is endemic.
Mized Zone.
Immune Region.
Boundaries of the States.
Boundaries of the Provinces.
BOLIVIA
PARAGUAY
URUGUAY
BRASIL
CHILE
Valparaiso
SANTIAGO
MONTEVIDEO
Region where the Tristeza is endemic
Mixed Zone
Scale
Constanza
Aurelia
Sº Justo
SANTA-FÉ
Santa Fé
Paraná
Région où la TRISTEZA est endemique
Zone mixte
LAS ROSAS
Rosario
Juarez Celman
PROVINCIA DE
Rio Paraná
PROVCIA DE ENTRE-RIOS
Scale
50 0 50 100 150 200 K.

South, where the disease is unknown, and a mixed zone of which the principal nucleus is the rich district of Rosario, where lucerne fields form widely-extended immune localities in the midst of the infected regions.

The lines which I have indicated on my map as limiting the homes of infestation are necessarily slightly imaginative, since in order to satisfy myself personally of their absolute exactness, I should have required several years of exploration.

Now that we know the bovine malaria better, it will be easier to determine the exact geographical area of this disease. Meanwhile, the indications recorded on my map give a sufficiently good idea of the dangerous regions.*

THE IMPORTANCE OF THE BOVINE MALARIA FROM THE BREEDING POINT OF VIEW.

According to locality, bovine malaria has a variable importance. As a matter of fact, it is the northern districts—that is to say, those in which the disease is endemic, which suffer least from it. Indeed, on a large number of properties, the disease is not even known, because on these they raise only the *criollo* (native) cattle, and we are aware that under these conditions, the young calves are naturally vaccinated by the ticks. Still, one occasionally sees, even amongst these herds, epidemics of malaria more or less fatal.

But, in order to compete in foreign markets, to produce a return which shall harmonise better with the greater cost of keep and location, it is necessary to breed animals of prime quality, which are got by importation of the blood of celebrated breeds, notably the Durham and the Hereford.

It is when these well-bred animals are introduced into the infested districts that the whole gravity of the malaria is felt. The further one goes from the north, the more difficult and the more costly becomes the improvement in the cattle. There are some districts in which the mortality amongst imported cattle ranges from 50 to 60 and 80 per cent. There are even cases in which it has reached 100 per cent. I know an extensive breeder to the north of Santa Fé who, after fifteen or twenty years of unheard-of efforts, succeeded in acclimatising on his station several fine-bred bulls. To arrive at this result, he assured me he had lost more than 1,000,000 francs (over £40,000) in imported breeding cattle which died of malaria.

Thus, it is in the difficulty of improving stock in the infested district that the seriousness of malarial disease lies, and it is just the most progressive cattle-owners who pay the heaviest tribute to the disease. In the mixed zone, where the land is not swampy, there are splendid plains suited to the perfect and rapid fattening of cattle, and the southern proprietor reaching this limit often suffers enormous losses in consequence of the malaria.

We have seen how Nature opposes the invasion of bovine malaria. Yet, at the same time, there is always the dread of the progressive adaptation of the ticks to the immune districts. In the same way as microbes become accustomed to encroach little by little upon media at first unsuitable to them, so the ticks may, in the limiting zone, accustom themselves to thrive in climatic conditions formerly inimical to them.

Bovine malaria always constitutes a danger for localities to which the ticks may be transported alive and where they will find a location suitable for their multiplication. On the other hand, there is no need to exaggerate the danger. Thus, for Europe, or for any country which demands a voyage of twenty-five or thirty days, the transmission of the malaria need not be feared, since on arrival, the ticks will have fallen off, leaving the animals free from the parasite, which is the only efficacious medium between the hæmatozoa and the cattle.†

* With the aid of the information which I have obtained, and the numerous examinations of blood sent from different parts of the Republic of Uruguay, I have been able to prolong approximately the lines delimiting the infested zones, from the Argentine to Uruguay.

† The eggs, which might preserve the species for some time, are not hatched out on the animal, but on the ground, as we have seen.

(To be continued.)

ON THE VALUE OF TUBERCULIN—No. 3.

By C. J. POUND, F.R.M.S., Government Bacteriologist.

There can be no question whatever that tuberculosis is the most prevalent of all diseases among the bovine species, and has been known to exist to a greater or lesser extent in every country throughout the world. The following will afford some idea of the ravages of the disease and the losses which must necessarily accrue to those who are directly and indirectly connected with the live stock and meat industries.

Between October, 1897, and January, 1899, the officers of the Board of Agriculture in Great Britain tested with tuberculin 1,651 herds, comprising 48,677 animals, of which 31·7 per cent. exhibited a typical reaction. In some parts of Denmark tuberculosis among cattle has been shown to exist to the extent of from 40 to 60 per cent., and in many districts in Germany fully 80 per cent. of the cattle have been proved to be infected with the disease. According to statistics it appears that in Sweden about 20 per cent. of the cattle are infected.

It must not be supposed that the high percentages of disease in the foregoing cases are indicative of its general prevalence. As a matter of fact, in every country the extremes have a very wide range. The reports from the abattoirs at Baden show only 2 per cent. of disease among cattle slaughtered, while Paris reports 6 per cent., and Holland 20 per cent. In a large number of German abattoirs it is stated that 6·9 per cent. of the cows, 3·6 per cent. of the steers, and 2·6 per cent. of the bulls, and 1 per cent. of the young stock are tuberculous. In New York State the Inspector of the State Board of Health found 3·4 per cent. of tuberculous cattle out of 20,000 examined. In Baltimore among the dairy cattle 11·3 per cent. were found to be tuberculous.

Wherever statistics are carefully compiled it has been clearly shown that tuberculosis exists to a greater extent amongst dairy cattle, which accounts for the comparatively low percentage of animals found tuberculous at public abattoirs and meat export works, where, as is well known, the majority of animals slaughtered are steers.

Dairying is the staple industry of Denmark. Moreover, it is an established fact that the dairy products from that country have for a great many years commanded the London markets. When tuberculosis was proved to be an intercommunicable disease of man and animals, and was further demonstrated to be very prevalent amongst dairy cattle, the Danes, in order to keep up the high standard of the quality of their butter and cheese before the British consumer, decided to adopt more stringent measures with regard to the inspection of their dairy herds. For several years the Danish Government have voted nearly £6,000 annually for the purpose of assisting cattle-owners to make use of tuberculin. Only those owners, however, who will undertake to keep the healthy animals from those that react can benefit from the gift of tuberculin, together with the services of a veterinary surgeon, free of cost. Up to the present time over 250,000 cattle have been tested, and the whole of the work is under the direct superintendence of Professor Bang, one of the greatest authorities on cattle tuberculosis. The results have been eminently satisfactory, considering the simplicity and slight cost of the arrangements necessary to bring about success.

In Norway and Switzerland action has been taken to supply tuberculin gratuitously to such stockholders as wish for it. In some of the American States very active measures have been taken to combat bovine tuberculosis by means of tuberculin. In Belgium, which was the first country to legislate on the subject, the Government passed a regulation permitting the use of tuberculin only under the special authorisation of the Minister of Agriculture, in order to prevent frauds which might easily be committed were anyone allowed to use it.

Numerous experiments have been carried out at the agricultural and veterinary colleges, and the bacteriological and health institutes in the various States in America, and throughout Great Britain and continental countries, on the use of tuberculin; and pamphlets, in all cases recommending the use of tuberculin and the prevention of tuberculosis, have been widely distributed.

CONCLUSIONS.

From all that has been written, and the legislation that has been enacted in different countries, it is apparent that tuberculosis is considered a contagious disease, and, in consequence of its insidious and at the same time dangerous nature, it should be eliminated or at least controlled.

It is to help the stockbreeders and dairy farmers to keep their herds free from tuberculosis that this article has been specially written. Those who will carefully study the information contained therein will acquire a knowledge of how it affects the individuals in a herd, and also how its ravages may be prevented. By proper management, as described in this and previous articles, cattle-owners may succeed in keeping healthy herds without the great loss entailed by the indiscriminate slaughter of all animals showing traces of tuberculosis.

Professor Nocard, of the State Veterinary School, Alford, France, says :—

"It is not necessary to contest the question whether contagion is the principal cause of the rapid and incessant progress of bovine tuberculosis; heredity contributes very feebly to it, and it may be said its agency in spreading the disease is insignificant, and may be practically disregarded. Thousands may be quoted, both with respect to man and beast, where the offspring of parents, either or both of which were tuberculous, have lived without having presented the least symptoms of tuberculosis. In the course of a large number of examinations that I have been able to make, I have found adult cows in a tubercular state, and I have seen their places in the herd subsequently taken by their own calves, which were perfectly healthy."

All through this article the line of thought has been more or less directed to the prevention of the spread of the disease from animal to animal. The fact, however, must not be lost sight of, and I lay great stress on it here, that an animal attended by a tuberculous person who spits about the cowshed might take the disease; therefore, it is evident that we have to make a crusade against this disease from a number of standpoints. We find cattle becoming tuberculous from the human subject and *vice versa*, thus forming a complete circle of invasion ; the more frequently this circle is broken, the more sure we are to ultimately get rid of tuberculosis. Medical men can do a lot to break the circle between the individual human subjects, and can also to a certain extent break the circle between the human subject and the animal, but it is very difficult indeed, unless co-operation takes place from all sides, to break the circle at other points.

It is quite true that the Government of this State have instituted measures which look after infected meat and milk for the protection of man, but this alone is a long way round to achieve the idea of controlling tuberculosis. The right way is to go to the source, and the only logical way to protect man against infection from cattle is to prevent and stamp out the disease from the animals themselves.

In a large country like Queensland, where the population is so widely scattered, and where veterinary surgeons are few and far between, it is practically impossible, considering the cost which would be involved, to have the same legislative measures as exist in Denmark. Therefore, in making an active crusade against tuberculosis, the stockbreeders and dairy farmers must be relied upon to do their share of the work, but in order that the work may be carried on to the very best possible advantage it becomes necessary to acquire a knowledge of the character of the disease and of the causes that are conducive to its spread.

Not only will the staff of the Bacteriological Institute give advice and earnestly render every available assistance within reason, but I feel confident that the Government veterinary inspectors, the officers under the Live Stock and Meat Export Act, and the dairy inspectors will be only too pleased, as far as lies in their power, to impart all the necessary information relating to a rational means of suppressing tuberculosis, the ravages of which must be seriously considered as a national loss.

Agricultural Patents.

PATENTS ACCEPTED.

Share and Foot-piece for Stump-Jump Ploughs.—Class 28 (6 Figures)—5664: John Shearer and David Shearer, both of Main street, Mannum, South Australia, machinists. "Improved Share and Foot-piece for Ploughs and other Cultivating Implements." Dated 1st September, 1900. (Drawings, 7s. 6d.; specification, 6s.) A strong steel liner or foot-piece connects the special share to the stem to give strength for stump-jumping. The foot-piece is bent against the stem, to which one flange is attached by rivets or bolts, the other flange having a curved surface to suit the share and mould-board. The share-plate has the land side turned inwards and upwards to form a socket into which the foot-piece fits and becomes more securely jammed by collision with obstacles. (5 claims.)

Desiccated Milk Products and Apparatus.—Class 32 (7 Figures)—5903: Joseph Henderson Campbell, of Hotel St. George, borough of Brooklyn, city of New York, United States of America, chemist, and Charles Henderson Campbell, of corner of Oak lane and Ninth street, Oak lane, Philadelphia, Pennsylvania, United States of America, manufacturer. "Improved Condensed or Desiccated Milk, and Process and Apparatus for Preparing the same." Dated 22nd February, 1901. (Drawings, 17s. 6d.; specification, 26s. 6d.) The condensed and desiccated milk products prepared at temperatures below 72 degrees C., which are capable of re-solution to normal milk, are claimed; the final product is a dry, pulverised milk flour. The desiccation is done at atmospheric pressure by subdivision of the milk in currents of air. In the first stage the milk is heated by circulating steam-heated water in through-pipes and a jacket, the milk being simultaneously agitated by warm or cool air-blast; as the volume of the milk diminishes the level of the heating water is also lowered in the jacket and pipes. In the second stage the condensed milk is placed in a revolving drum and the hot air is projected against the film of milk carried over the upper part of the interior of the drum until the mass can be scraped out in a granular, pasty condition. In the third stage this is passed through a breaking hopper with hot air-blast, and then scraped through a sieve to the third revolving drier, which consists of a canvas rotating drum with central air-pipes projecting warm blast against the mass of powder turned over by the rotation. The final product from this drying contains less than 8 per cent. of water, and may be ground to flour. Other products with wheat-flour and cocoa are mentioned. (20 claims.)

Cane Saw with Pneumatic Motor.—Class 30 (5 Figures)—5948: Alfred Joseph Lewis, of Burnett street, Bundaberg, Queensland, nuisance inspector. "A rotary Cane Cutter." Dated 1st April, 1901. (Drawings, 10s.; specification, 2s. 6d.) A pneumatic rotary motor of any suitable design carries a circular saw secured on the motor spindle. The apparatus is held by a suitable handle, and the supply pipe drags along the field. Only one cane is cut or topped at one time by this tool. (1 claim.)

Pneumatic Sealed Provision Can.—Class 76 (3 Figures)—5880: George Lees, of No. 4228 Oakenwald Avenue, Chicago, State of Illinois, United States of America, packer. "Improvements in or connected with Sheet-metal Cans or Receptacles for Enclosing Preserved Provisions or Food and the like." Dated 5th February, 1901. (Drawings, 5s.; specifications, 5s. 6d.) A sheet-metal canister for food products has a recessed rim on the cover and body into which a rubber ring is fixed by the air-pressure on the lid. The particular conformation of the joint is claimed. (3 claims.)

General Notes.

TO KEEP WHITE ANTS FROM A BUILDING.

All houseowners both in town and country know by experience the destruction caused by Termites when once they have effected a lodgment in a building either of stone, brick, or wood. It is expensive work getting rid of them and replacing the damaged timbers; therefore, the best plan is to build in such a way that the pests have no chance of gaining an entrance. Hence, in a wooden building, the stumps on which the lower framework rests demand the most careful attention. In the first place, no stump should be used which is the least gone or "dozy" at the heart. Neither should any that have radiating cracks from the centre to the circumference be employed. In the next place, every stump should be thoroughly sapped well into the old wood, and stumps should also never exceed 12 inches in diameter of solid wood, neither should they stand out of the ground at any less height than 2 feet or 2 feet 3 inches. Suitable stumps of this kind having been prepared, the next operation is to tar them. Some char them before tarring, but this is worse than useless. The heat causes the timber to crack longitudinally by the expansion of the moisture by heat, and a dozen channels are thus opened for the entrance of the enemy. Stumps should not be dressed with cold coal tar. It should be thoroughly boiled until every particle of moisture and volatile oils contained in it are driven off. It should then be allowed to cool, and next day it will be almost solid. When all is ready, warm the tar till it becomes fluid enough to apply. Give the stumps two heavy coats of this, not forgetting the end which is to be set in the ground. Now pour some crude cold tar into the stump hole and set the stump on this. See that it stands in the same position as it occupied in the growing tree, the small end uppermost. Then slightly damp the soil to be returned with crude tar, and ram it in firmly. The lower end is now quite secure. The upper end should be covered with a 24-gauge galvanised iron cap.

On no account allow a spike to be driven through the cap to hold the ground plates. There is not any need for a spike, as the weight of the building will hold everything firmly in its place.

The building will not shift; and if a hurricane comes along, the spike would not hold any more than a wooden peg. Thus both top and bottom of the stump are so far absolutely safe from the white ants.

But all this will be useless unless great care is taken with the building of the chimney. This should have a concrete foundation, and be capped with iron projecting about 3 inches all round, set lower than the stump caps. Thus the ants can find no means of communication with the building by means of the chimney.

Finally, veranda steps should be carefully isolated by setting the sides of the steps on short stumps well clear of the ground, capped and tarred as before directed. The house is now practically safe. But there is still a source of danger, and one that is commonly disregarded. People find the under part of the house a convenient storeroom for old timber, cases, and barrels. This lumber is often pushed under the house, touching the joists. The ants are not long in finding this out, and once they do so all the previous precautions will be of no avail. There is a case on record where the Termites entered a building by constructing a tunnel up a piece of stiff grass which grew up just inside a stump, and touched the flooring of the house. Therefore, all weeds, *Sida retusa*, &c., should be carefully cleared away, and no lumber be allowed to connect the joists with the ground. By attention to these points there will be no danger of a house being invaded by this one of the greatest pests of hot climates.

TO CURE SELF-SUCKING COWS.

Shape a piece of hardwood, 8 inches long and $\frac{3}{4}$ inch thick, the sides being levelled and the ends pointed, cut the groove $\frac{3}{8}$ inch deep. Throw the cow, and when perfectly motionless pierce the grizzle of the nose with a sharp narrow bladed knife and insert the stick. The stick must fit close or it will not stay, hence the need of making the hole small; once in, it will not distress the cow. There are many devices having the same object, but this seems to answer the purpose best.—*Australasian.*

THE WORK OF LEAVES.

Under the belief that the sun has a great deal to do with ripening fruit, many people remove the leaves of grape-vines and tomatoes to allow the sunlight to reach the fruit. *Meehan's Monthly* says—

Sunlight does usually add to the sweetness and general good character of the fruit; but ripening is a vital process, in which an abundance of good, healthy foliage is the prominent agent in the work. In short, a bunch of grapes ripening in comparative darkness would be far preferable to one grown in the full light with most of the vine leaves taken off. But the leaves themselves must be vigorous and healthy. They are not healthy when crowded.

For this reason, the good gardener thins out the weak branches in the early stage, so as to have plenty of room for the development of larger ones later on.

TO WASH SILK.

We learn, on the authority of the *Scottish Farmer*, that a new soap called "Silk Soap" has been placed on the home market which is excellent for washing silk blouses or handerchiefs, or ties, coloured muslins, or any other delicately coloured washing material. Make a warm lather and wash with the usual care. Do not hang outside to dry, but wrap the article in a clean dry cloth; put aside for an hour or two, then iron on the wrong side while still damp.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

COTTON.

A.C., Roma.—The sample of cotton you sent us is very fair upland cotton, and would, if ginned, fetch from 5d. to 5½d. per lb. in Japan. The lint adheres rather too firmly to the seed, thus a little extra loss would result in ginning. However, if fibre can be grown of such good quality in the Roma district, especially in a drought which destroyed the maize crop, and if the average yield per acre comes up to that of the coast districts, the farmers of your district will find it a crop suitable to the dry climate, and should certainly give it a trial. This cotton would sell readily, being of a good colour, fairly strong in the fibre, although the length of the staple is not equal to that of the best varieties of upland cotton.

Mr. P. Petersen, Aloomba.—

1. Is the cotton bush referred to in the *Queensland Agricultural Journal* an annual, or is it the cotton bush which bears for a number of years?

Answer.—The cotton referred to is the upland variety, which, in Southern Queensland may be treated as an annual, or it may be pruned and will be profitable for two years. If pruned, the crop comes on earlier then when the plant is grown from seed.

2. Would cotton grow on fairly good sugar land, free from flood, in the Cairns district?

Answer.—Cotton should do well on the poorer soils round Cairns. The richer land would force the growth of the wood, which would mean a small crop of lint. The drawback in the Cairns district would be the excessive wet season at ripening time. But experiments might be made with late planting, so as to delay the picking season till the wet season is over.

3. What would ginning machinery cost without driving power?

Answer.—A cotton gin with condenser costs 15s. per saw, and the gin would cost from £25 to £50, according to the number of saws.

4. Where would cotton seed be saleable, or could it be easily pressed and manufactured into oil cake, or would the residue, after extracting the oil, be good feed for stock, without pressing into cakes?

Answer.—Cotton seed is saleable in England, and in all probability Messrs. Lever Bros., of Sydney, would be prepared to buy. The seed should be decorticated—that is, the hulls should be removed—before shipping. The seed is then worth from £5 to £7 per ton. In this condition, or when the oil is expressed, it is excellent feed for stock. Machinery for expressing the oil would cost from £500 upwards.

SHRINKAGE OF CORN.

W. Allen, Maroochy.—The general rule for estimating the shrinkage of corn was to put the loss at from 7 to 8 per cent. From an experiment, however, made by a most methodical farmer in the United States, a new light is thrown on the subject. He weighed one crib of corn when he put it up. The first load was cribbed 9th October and the last 22nd October. The total amount of corn cribbed was 34,970 lb. The first load was hauled out 8th January and the last 1st February. The total hauled out was 29,995 lb., showing a shrinkage of 4,995 lb., or 14 per cent.

PROTECTING TREES FROM ANTS.

C.F.G.—We have already given several remedies to keep ants away from trees. Try this one, given by the Botanical Department of Jamaica in a late bulletin:—

White lime (slaked)	6 quarts
Kerosene oil	½ pint
Turpentine	1 wine-glass
Soft soap	5 lb.
Cow manure	3 quarts
Water	16 quarts

Mix the whole thoroughly together, and apply freely with a paint brush, or whitewash brush, to the trunks of trees or the stems of shrubs requiring protection. It is also a good remedy in case of trees already affected by pests, killing scale insects, &c., immediately. If signs of "gumming" are observed in citron trees, to the above mixture should be added ½ lb. of flowers of sulphur. The mixture adheres to the trunks and branches of trees for a considerable time, but when it peels off the bark beneath will be found to be perfectly clean and free from pests, both animal and vegetable.

ANIMAL MANURE.

W. Ilford.—Numerous experiments have been made to ascertain the weight of manure produced by stabled animals. A horse produces from 5 to 6 tons of manure annually when stabled. This weight, as in other cases, includes the bedding. A bullock will yield 20 tons; a 60-lb. sheep, 15 cwt.; a pig, about 3 tons.

PASPALUM DILATATUM.

Cooroy.—You write as though *Paspalum* was the name of a single species of plant, whereas it is the name of a genus containing about 160 species, about twelve of which are natives of Queensland. You probably, however, have in your mind the South American species, *P. dilatatum*, a very excellent grass now being grown in Queensland, and is fast becoming naturalised.

It is not known that any species will run out bracken.

As to the particular month for sowing the seed, you will have to do this during showery weather; the present time would have suited.

If you intend to lay down a field with this grass, prepare in the ordinary way. Information cannot be given without a knowledge of the soil and situation. Consult some neighbouring farmer.

If you desire to plant roots of this particular grass, obtain a quantity of old stockroots, divide these into small sets, and plant them firmly in the ground all over your field wherever you find a small bare spot, choosing showery days for the work; such plants would soon take root, spread, and enrich the pasture.

Seeds can be purchased from the Brisbane seedsmen, who would also obtain rootlets for you. Roots may also be obtained at the Queensland Agricultural College, Gatton. *See* advertisement in this issue.

BLOWN CATTLE.

R.H., Glamorgan Vale—

Question.—What is the best remedy for cattle swollen on lucerne?

Answer.—Either of the following remedies may be attended with success:—

1. A solution of baking soda in water. Fron ½ pint to 1 pint as a drench.
2. Dip a stick in coal-tar and place it on the patient's tongue. This said to be, by Mr. E. F. Webb, of Bathurst, New South Wales, the most simple and the best remedy.
3. Puncture the left side on the upper part of the cavity in front of the hip.

MIXED FARMING.

J. W., Ipswich, asks :—

1. Why are sheep not kept on farms surrounding Ipswich? Is it because they do not thrive well, or because they do not pay the small farmer?

Answer 1.—The reason sheep are not kept in the coastal districts is that they do not thrive on any part of the coast watershed. They can only be profitably bred and kept in the western slopes and inland districts. They become anæmic and succumb to "rot" in the humid coast climate.

2. Where in Queensland are mixed farming and sheep-keeping conducted on a small scale, say with a capital of about £2,000?

Answer 2.—Mixed farming is largely carried out on Darling Downs, and is one of the most profitable means of occupying the land, as the grazing of sheep on agricultural land is the cheapest and one of the best means of manuring.

A CHEAP RAIN-GAUGE.

H.R.S., Toowoomba.—How may a simple and effective rain-gauge be made?

Answer.—If you wish to avoid the expense of making a standard gauge and having a graduated glass, the only cheap means of getting an approximate estimate of the rainfall would be by cutting a kerosene tin in two, and using one end as a catchment and measuring the water in the tin with a foot rule. The edges and sides of the tin must be straight, and the whole placed on a level surface.

COW WITH HARD UDDER.

Dairy Farmer, Westbrook, asks for a remedy for a cow whose udder has become hard on one side.

Answer.—Bathe the udder well with hot water and soft soap. Then rub in Elliman's Embrocation. Do this twice a day. In a few days the hardness should have disappeared. Should the milk afterwards be curdy, a very simple siphon can be obtained from Mr. Irving, Veterinary Surgeon, Ann street, Brisbane. Price, about 2s. 6d.

The Markets.

AVERAGE TOP PRICES FOR MAY AND JUNE.

Article.		May. Top Prices. £ s. d.	June. Top Prices. £ s. d.
Bacon ...	lb.	0 0 8	0 0 8
Bran ...	ton	4 15 0	4 15 0
Butter, First ...	lb.	0 0 9⅛	0 1 0¼
Butter, Second	„	0 0 7 3/16	0 0 9⅕
Chaff, Mixed ...	ton	4 7 6	4 0 0
Chaff, Oaten ...	„	5 5 0	5 10 0
Chaff, Lucerne	„	3 17 6	4 4 6
Chaff, Wheaten	„	4 0 0	4 0 0
Cheese ...	lb.	0 0 7⅛	0 0 7 7/10
Flour ...	ton	7 10 0	7 10 0
Hay, Oaten ...	„	4 0 0	4 15 0
Hay, Lucerne ...	„	2 12 6	2 19 0
Honey ...	lb.	0 0 1¾	0 0 1⅘
Rice, Japan (Bond)...	ton	14 10 0	14 7 0
Maize ...	bush.	0 3 4⅜	0 3 2⅘
Oats ...	„	0 3 1½	0 3 0⅕
Pollard ..	ton	4 15 0	4 16 6
Potatoes ...	„	4 18 9	5 10 0
Potatoes, Sweet	„	2 6 3	2 4 0
Pumpkins ...	„	1 11 3	1 17 0
Sugar, White ...	„	16 5 0	16 15 0
Sugar, Yellow...	„	15 11 3	14 14 0
Sugar, Ration ...	„	12 8 9	11 6 0
Wheat ...	bush.	0 3 1½	0 3 0⅘
Onions ...	cwt.	0 10 9	0 14 0
Hams ...	lb.	0 0 9	0 0 9
Eggs ...	doz.	0 1 3 3/16	0 1 1⅘
Fowls ...	pair	0 3 6½	0 3 7⅘
Geese ...	„	0 5 0	0 5 8¼
Ducks, English	„	0 3 11¼	0 4 3⅘
Ducks, Muscovy	„	0 4 8¼	0 4 10
Turkeys, Hens	„	0 5 10½	0 6 1⅘
Turkeys, Gobblers ...	„	0 12 6	0 11 0

ENOGGERA SALES.

Article.	May. Top Prices. £ s. d.	June. Top Prices. £ s. d.
Bullocks ...	9 11 0	8 2 6
Cows ...	7 10 6	5 18 1½
Wethers, Merino	0 16 9	0 15 6
Ewes, Merino ...	0 14 7	0 13 7½
Wethers, C.B. ...	0 18 0	0 16 7½
Ewes, C.B. ...	0 18 3	0 15 9¾
Lambs ...	0 12 9¾	0 12 5¼
Baconers ...	2 5 0	3 2 0
Porkers ...	1 16 4½	1 15 2
Slips ...	0 8 3	0 17 8

Orchard Notes for August.

By ALBERT H. BENSON.

The planting of deciduous trees should be completed by the end of this month in all parts of the State, but evergreen trees can be transplanted during seasonable moist weather at any time of the year if the operation is carefully carried out. When set out, the young trees must be cut hard back to a height that in no case should exceed 2 feet from the ground, and in warm dry districts half of this height is to be preferred. Cutting back at planting insures a strong and vigorous young growth, whereas by neglecting to cut hard back at planting the future growth, vigour, and symmetry of the tree are greatly impaired if not completely spoilt. The pruning of all deciduous trees must also have been completed; and all citrus fruit trees from which the fruits have or should have been gathered should be gone over carefully, all dead and badly diseased wood should be removed, and any crossing or superfluous branches, or water sprouts, should be cut away. When the trees are badly attacked by scales, this pruning should be severe, in order that the remedies used for dealing with these pests may have a fair chance, as when the top of a citrus tree is allowed to grow like a mat it is impossible to get the spraying material on to the parts where it is most wanted. Spraying should be systematically carried out in every orchard in the State during this and the preceding month, and in the case of fungus diseases on deciduous trees during the following month as well. Spraying is just as essential an operation as the gathering of the fruit; and no fruitgrower who wishes to make fruitgrowing a success can afford to neglect it, as it is impossible to breed disease in fruit trees and to grow fruit profitably at one and the same time. A full description of the operation of spraying and of the most approved remedies was published some time ago in pamphlet form by the Department of Agriculture, so that any grower who has not received a copy and who desires to obtain the necessary information may obtain it by writing to the Department. After pruning and spraying, the orchard should be ploughed; so that all weeds and trash can be buried, and also that the land that has been trodden down firm shall be broken up. Use a short American plough that will take a wide furrow and turn it right over. The depth at which to plough will depend on the treatment the orchard has previously received and on the nature of the soil. If the soil is shallow, or if the land has never been worked, then the ploughing must be shallow or the roots will be badly injured; but where there is plenty of soil and a perfect sub-drainage, then the ploughing can be from 4 to 6 inches in depth (provided the land has been previously cultivated) without any injury to the trees. In fact, in such soil surface roots are not required, and the trees stand dry weather best when deeply rooted.

Quick-acting artificial manures, such as sulphate of ammonia, sulphate of potash, or superphosphate, can be applied during the month, but care should be taken not to apply too large a quantity at once, as, owing to their extreme solubility, a considerable portion of them is apt to be washed out and lost by heavy rains. In conclusion, one more word about spraying, and that is: Do your utmost to stamp out diseases in new districts as soon as ever they make their appearance. Do not consider any disease too trivial, and that it can be well let alone to a more convenient time, as the more convenient time will not come; but the disease will flourish and spread rapidly, so that what might have been checked, if not eradicated, by half-an-hour's work, will now take the grower all he knows to get the better of it. In spraying, whether for insects or fungi, a knowledge of the pest to be treated, combined with carefulness and promptitude, are the essentials of success.

In notes of this kind it is impossible that they can apply equally to every part of the State, but they will be found to be about an average. Very early districts will sometimes require the notes of a month later, and very late districts those of a month earlier; but this will right itself when a year's notes have been written.

Farm and Garden Notes for September.

FARM.—Spring weeds will now be asserting themselves; therefore keep all growing crops clean by a vigorous use of hoe and scarifier. Earth up all crops requiring it. The weather and soil are now warm enough to allow of the sowing of maize, sorghum, imphee, prairie grass, panicum, tobacco, pumpkins, sweet potatoes, &c. Make the sweet potato cuttings from 8 inches to 12 inches long, plant in ridges with a dibble, and press the soil firmly round the plant. Cane-planting should be carried on vigorously. Plant out coffee, ginger, arrowroot, and yams.

KITCHEN GARDEN.—All attention paid to the vegetable garden now will be amply rewarded. Seeds sown now and vegetables transplanted will germinate and make a more rapid growth than in the previous cooler months, the soil and atmosphere being sensibly warmer. This is the best month for general sowings of all kinds of vegetables. Plant out rhubarb, Jerusalem artichokes, seakale, and asparagus. Transplant cabbages, cauliflowers, eschalots, &c., for a succession. Melons, cucumbers, vegetable marrows, custard marrows, tomatoes, and egg plants may all be sown. Keep the beds clean, and use liquid manure. Newly-dug beds will benefit by a top-dressing of salt. Very little should be used, or "hard pan" will be formed. Cabbages are improved by a little salt. Sow Lima beans in rows 3 feet apart for dwarf kinds and 6 feet apart for climbers. Sow French beans. Do not forget the Madgascar bean. It is a better and sweeter vegetable than the broad bean. Sow a few rows of beetroot, St. John's Day cabbage, celery, carrots, and turnips. Always sow turnips in drills. Peas may still be sown, except in very hot districts. Sow rhubarb seed in boxes to furnish plants for next winter.

FLOWER GARDEN.—Continue to plant out bulbs, especially dahlias in soil well enriched with manure. Put in cuttings of all tropical plants. Coleus cuttings should be planted at once. Disbud roses as they make new growth, and keep them trained. It saves pruning and tying up in a hurry. Early in the month divide chrysanthemums, and give the plants plenty of manure. Stake up all plants requiring it, such as gladioli, &c. Bush-house and veranda plants will now require to be re-potted. See that the pots are thoroughly clean. Protect all plants as much as possible from cold westerly winds. Keep a good lookout for slugs. If toads are in the garden or bush-house encourage them to remain; they destroy thousands of noxious insects, and are perfectly harmless themselves in spite of their ugliness. Fill up all vacancies with herbaceous plants. Sow zinnia, gailliardia, amaranthus, cox-comb, balsam, sunflower, marygold, cosmia, summer chrysanthemum, coreopsis, calendula. Plant out cannas.

OBITUARY.

THE LATE HON. W. H. GROOM, M.P.

By the lamented death of the Hon. W. H. Groom, so long a member in the State Legislative Assembly for Toowoomba, and, since the establishment of the Commonwealth, a Queensland representative in the Federal House of Representatives, that body has lost a most valuable, clear-sighted, and well-informed colleague, and the agriculturists of the State a staunch advocate. To him, it may truly be said to be owing that the Darling Downs has reached a position of agricultural stability, wealth, and population which places that favoured district in the forefront of all the agricultural communities of the State. In common with all who knew him or knew his life's work, we tender our sincere sympathy to Mrs. Groom and her bereaved family, who have at least, in their great sorrow, the consolation of knowing that the memory of the husband and father will for ever be cherished in the land of his adoption, which he served so faithfully and so well.

Agriculture.

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE—JUNE, 1901.

Farm.—An area of 30 acres in creek paddock, No. 1, has been ploughed, cultivated, and planted with wheat. Seventeen acres, lately under panicum, has been ploughed; this land has since been sown with barley. The plot adjoining the above has been cleared of cornstalks and ploughed for wheat. The mowing of the young lucerne has been finished, and the crop carted to the stock or placed in a silo. Twenty-four acres in the garden paddock (lucerne) have been mown and harvested. A small crop of panicum ($1\frac{1}{2}$ acres) has also been cut and carted to the hayshed. A large amount of chaff has been cut during the month, a considerable quantity being required as horse-feed by ourselves. One ton 17 cwt. of oaten and 7 tons 4 cwt. of mixed chaff have been sent to Brisbane for sale, where satisfactory prices were realised. A commencement has been made to clear the creek paddock, No. 2, of weeds, preparatory to ploughing and planting with barley and other crops.

The total rainfall for the month was 2·93 inches, the heaviest falls being on the 7th, 1·11; 10th, 0·62; 26th, 0·45; 27th, 0·59. The large amount of rain for this season of the year will account for the lateness in planting our crops.

Garden and Orchard.—The avenue to the College siding has been replanted with plane trees, filling up the gaps where these formerly planted had failed. The ground around those planted last year has been dug up and mixed with sand in order to facilitate cultivation. Around the main buildings camphor-laurels and *Schinus Molle* have been planted. The flower beds have been dug over and cleaned up. The top orchard has been cultivated and hoed. In the creek garden, cabbages and cauliflowers have been planted out, but have suffered much from the winds. A large area has been sown with onions of the following varieties:—Brown Spanish, The Queen, Early Golden Globe, and White Mammoth. Asparagus tops have been cut down and the bed made ready for cultivating. The vineyard has been ploughed and hoed. Rain has greatly interfered with the work of cultivation.

Dairy.—During the month the average number of cows milked daily was fifty-four head, the average daily yield being 16 lb. The cows were grazed chiefly on the natural grasses, but were allowed for some two hours daily to feed on portions of the cultivation. Five hundred and ninety-nine gallons of milk converted into cheese yielded 635 lb., and 919 gallons gave a return of 372 lb. of butter.

The increase of stock during the month was as follows:—Jerseys, 1 male; Grades, 2 males, 6 females.

Piggery.—Increase for the month:—Pure Berks., 2 boars, 3 gilts; Middle Yorks., 7 boars, 2 gilts; Berks. Grade, 5 head. Sales during the month: Pure Berks., 5 boars, 4 sows; Middle Yorks., 1 sow; Berks. Grades, 6 head; Middle Yorks.-Berks., 1 head.

Mechanical Department.—During the month the extension of the poultry yards has been commenced; this work is yet unfinished. Pig crates and cheese boxes have been made. The chairs, tables, &c. have been overhauled and repaired where necessary. Several gates have been made and hung. In the blacksmith's shop, besides the usual routine work, such as horseshoeing and minor repairs, the mowing machines, ploughs, horse rakes, and other farm implements have been repaired and put in good order.

FIRST STEPS IN AGRICULTURE.

FIRST STAGE.

8th Lesson.

In our last lesson you were shown the necessity of getting rid of water which, owing to its quantity and stagnation, has an injurious effect on crops. But the farmer has another and often a more serious trouble to deal with, and that is a want of water. Those of you who live in the country know that when no rain falls for many months the crops languish and die, there is not enough grass in the bush or in the paddocks for the cattle, the waterholes dry up, the creeks stop running, and often the farmers have to go several miles for water. When the dry weather continues for many, many months, there occurs what is called a "drought," and this drought is a very terrible calamity for the country, because almost every other industry depends upon the farming and pastoral industries. If there were no wheat crops, there would be no flour, and, therefore, no bread. If maize, oats, and lucerne died out, it would not be possible to keep horses on the mines and in the towns. The men could not live without bread, and the horses would die without hay, corn, and chaff. Then the gold, copper, silver, and coal mines would not be worked, the trains could not run for want of coal, the steamers would all be laid up, and the country would be in a dreadful state. No one could earn any money, and thousands of people would starve. So you see how necessary the farmers are to the world. They are indeed the most important of all people engaged in producing things for other's use. But the farmer cannot produce anything without water in some shape. If it does not come in the shape of rain it must be got on to the land in some other way. That way is called "irrigation"—that is, the application of water to the land to cause it to produce crops at once, or to enable it to produce crops by and by. There are several reasons why some lands should be irrigated. What are they, you say? Here are a few:—

1. To increase the crops on which man and beasts depend for their subsistence.
2. To supply the moisture which the want of rain has withheld.
3. To supply the necessary *extra* moisture which certain plants require more than others. Swamp rice is a good example of such plants.
4. To get earlier crops in consequence of the warmth supplied by the water on well-drained land.
5. The water used in irrigation often contains a supply of valuable plant-food, which is useful as manure.

There are other reasons for irrigating land, but these five are sufficient for you to know at this stage.

In some countries thousands of pounds are spent on storing water and constructing watercourses to convey it to the land. In Egypt, India, Italy, America, and many other countries, the people have gone to great expense and labour to irrigate their farm lands. In Egypt £5,000,000 are now being spent to irrigate the lands on both banks of the Nile. The Dutch in South Africa always took care to bring water on to their farms before they did anything else.

A people called the Mormons, a religious sect in North America, settled many years ago on the shores of the Salt Lake, in Utah, in the United States of America. Utah, or Salt Lake City, is a very beautiful place, surrounded with beautiful orchards and farms and gardens, and thousands of people live there. But when the Mormons reached the lake after a terrible journey across the prairies and mountains, they saw only a great salt lake with the shores glistening with white salt. There was no good grass, no good water. The place was a desert. But these brave people set to work and cut canals, and built dams and watercourses and brought the sweet water from the hills many miles away. Then they planted fruit-tree seeds and vegetable seeds, and they

manured and watered them, till at last there was a lovely garden of a couple of acres round the house of each family. Then they ploughed up fields and irrigated them, and got large crops. Afterwards, as they got richer, they built by degrees the beautiful city called Salt Lake City. And all this was done by the help of water and drainage.

Do you know that all over Western Queensland, where there is little surface water, holes called "bores" have been sunk to reach water. These bores are holes drilled by machinery, and they are usually very deep. Some are 3,000 or 4,000 feet deep, and they cost a great deal of money. In the State of New South Wales there are bores which have cost £10,000 for a single one. They are sunk until the drill reaches what is called "artesian" water, and they are called "artesian" wells because such wells were first made in France in the province of Artois.

The water is contained in certain rocks lying underneath other rocks, through which it cannot pass. But the moment the hole is bored through these upper rocks, the water is released and rushes up the hole with great violence. Some of these bores pour out over 2,000,000 gallons, and even 3,000,000 gallons, of water in a day.

Just think what a glorious discovery it was when wise men found out that deep underneath the driest parts of Australia there were immense quantities of water only waiting for a narrow hole to be bored through the rocks above to rush up and form running creeks, which have saved the lives of thousands of cattle, horses, and sheep. At a few of these bores farms have been laid out, and beautiful crops are grown where before the bore was made it was hard even for poor grass to grow. But all bore waters are not good for plants. Some are so full of magnesia, and iron, and a number of other things with long names, which you need not trouble about now, that it would never do to water plants with them. This water would freshen up the crops, but gradually the magnesia and lime and salt would accumulate in the soils and then nothing would grow in them. So the farmer has to be very careful about the water he supplies to his farm and orchard. In a future lesson I will explain to you the various ways in which water is supplied to the land, and I will also give you illustrations of the different methods of draining land. I shall have a great deal more to say about these things, so will leave the subject now, and ask you to answer these nine questions on irrigation:—

Questions on Lesson 8.

1. What is a drought?
2. What would happen if farmers ceased to grow crops?
3. What do you understand by irrigation?
4. Give five reasons why land is irrigated?
5. Name a plant which requires a quantity of water?
6. In what countries is irrigation largely carried out?
7. What are artesian bores? Why called artesian?
8. When does the water rush up the artesian bore? Why is this?
9. Are all bore waters good for crops?
10. Name two substances contained in some bore waters?

FIRST STAGE.

9TH LESSON.

I have already shown you that plants require for their proper growth light, air, and a certain regular supply of water; and you learned how the farmer supplies the first two by good cultivation. In a future lesson, you will be taught how moisture can be supplied also by diligent tillage of the soil. But these are not all the requirements of plants. You now know that all soils

are not alike—all do not contain the same amount of plant-food (*Lesson* 3). If you were to sow wheat in pure sand, or potatoes on stiff yellow clay, you would not expect to get a good crop of either; but there are soils which, whilst they will produce crops of a certain kind, yet are not suitable for those which require a large amount of solid nourishment.

Again, you have seen that there are soils so rich in plant-food that farmers keep on planting and sowing the same crops on them year after year, without reflecting that every crop takes out a certain quantity of the various plant-foods, and that therefore the land becomes poorer every year. Now, if you take some flour out of the flour-bag every day and put no flour back, or if you keep on paying away money out of your pocket without putting back what you have spent, you will before long get to the bottom of the bag or of your pocket, and will, when it is too late, begin to wonder why you have no more.

So it is with the soil. Each time a crop is taken off it takes with it all the ingredients which have built up the plants. If these materials are not replaced in some way, it is clear that after a time, longer or shorter, according to the natural fertility of the soil, the whole of the plant-food which the roots can reach will be carried away, and the land becomes at last like your pocket—unproductive. If there were no easy means of putting back what has been carried away, then farming could not be carried on unless every farmer had hundreds of acres of new land which he could plough up and plant when the old fields were useless. But even with thousands of acres the time must come when the whole would be worn out, and then what would become of the farmer? What, indeed, would become of the world? How would men and beasts live when the farmer would no longer produce wheat and barley and oats?

There is a saying in the good old Book: "The King himself is served by the field." And this is actually true. The whole business of the world, all the Governments, all soldiers and sailors, are kept in existence by the labours of the farmer, who is thus the mainspring of all.

But wisdom has been given to men to learn how to restore the fertility of the soil, and thus it happens that land which has been farmed for over 3,000 years still produces even better crops of all kinds than in olden times.

How this fertility is maintained is what you have now to learn. By and by we shall study the subject in its more advanced stage. All plants contain certain minerals and gases. Many of these are drawn from the soil, and, as I told you, must be returned to the soil in some form or other in order that nothing may be lost. It was long ago found out that stable and farm-yard sweepings contain all that is needful to give back to the land the ingredients taken out by the crops it has borne. These sweepings are termed *farm-yard manure*, and when this manure is carefully preserved and ploughed in to the land in sufficient quantities, the next crops sown will find ready at hand all the plant-food necessary to produce a good harvest.

But the use of manure is only one of the means adopted by the farmer to keep his land fertile. You have heard of very hard-worked men requiring a Rest. Business men, and men who work hard with their brains, must all rest sometimes, or they would become ill. You know that holidays are always given to school boys and girls. Why is this? It is because neither teachers nor scholars can keep on during the whole year with brain-work. There must be a time of rest to enable them to regain the brain power which becomes exhausted by continued work.

Well, the soil also requires rest, in order to recover from the exhaustion caused by continually producing crops. What is meant by "exhaustion" is this:—

When a soil has been put out of condition by continually cropping year after year without sufficiently manuring it, it is said to be exhausted, although

certain crops might still be grown on it. But a soil may be said to be quite exhausted, as regards any particular crop, whenever the cost of cultivation comes to more than the crop is worth. Suppose it cost a farmer £3 to produce an acre of maize, and that the crop on that acre in a good season only brought him in £2 19s. 6d., then you would say that the land was exhausted for that particular crop, although it might still produce a good crop of cotton or cow-peas. But the farmer wants to grow maize on the land, so he must do one of two things: He must either manure it properly, or he must let it lie "*fallow*" for a year. This means that the land is either left untouched, or it is ploughed frequently to destroy weeds, and, by ploughing them under, turn them into green manure, which gradually produces humus. The old Roman farmers used to leave a field fallow for a year after taking off a crop. But where the land is artificially drained there is no need for this "bare fallow" as it is called. On good clean soils or light soils bare fallowing is not necessary. On such soils, what are called fallow crops are taken and ploughed under for green manure; but in dry climates, on heavy, clay soils, on weedy land or sour soils, when the exposure to air and rain will sweeten and improve the soil, destroy insect life and clear off weeds, bare fallowing is of great advantage. Thus fallowing thoroughly cleans the soil and exposes it to the beneficial effect of rain and air, after which rest it may once more be put under cultivation.

Every plant taken from a field helps to exhaust the soil, but all plants do not exhaust it equally. Indeed, some plants, such as cow peas, beans, and many leguminous plants which draw "nitrogen" (a very valuable plant-food) from the air, restore this to the soil, but wheat, oats, barley, maize, &c., draw it from the soil.

You have now some idea of the necessity both for manuring and for giving rest to an exhausted soil. As I told you before, such a soil will, however, grow certain green crops, and the poorer the land the greater will be the necessity for a green crop to be ploughed under as manure. Many of these crops will renovate the soil and put it in condition to grow a crop of maize or wheat. Cow peas, velvet beans, rape, and even thistles and other succulent weeds will supply to the soil the materials from which "nitrates" (you will be told what nitrates are by and by) are produced. They also bring plant-food to the surface—that is, the soluble plant-food which is drawn up through the soil by the roots. Much of this is consumed by the plants, but far more than enough is drawn up, and thus remains for the benefit of the next crop sown.

If you have ever seen an exhausted lucerne field ploughed up and planted with potatoes, you would at once see how the lucerne fertilises the soil when the potatoes are harvested. Clover has the same effect, and many old farmers say that there is no need to manure a field which has carried clover or lucerne, because, although clover removes more plant-food, such as potash, lime, phosphoric acid, &c., from the soil than almost any other crop, and three times as much nitrogen as a crop of wheat, yet a great quantity of nitrogenous matter is left on the surface in the shape of dropped leaves, and still more in the roots. When lucerne is grown for seed, the leaves fall thickly on the ground, and thus provide a quantity of plant-food. Now, we will just run over this lesson, and see what we can derive from it. First, you learned that certain crops will grow on a light soil, whilst others require solid food, such as is contained in a rich soil. Then you were shown that, however rich a soil may be, if it is constantly cropped without anything being returned to it, it will eventually refuse to produce a crop worth as much as the cost of growing it. How the FERTILITY of the soil is kept up, why the land requires REST, and what is meant by EXHAUSTION of the soil, you now understand. Fallowing I have only mentioned to prepare you for a harder lesson hereafter on what is called the *rotation of crops*, but you can now at least understand what is the object of, and what is gained by fallowing. Lastly, I have pointed out to you that certain plants restore plant-food to the soil whilst others withdraw it. Now, let us propose the usual questions.

Questions on Lesson 9.

1. May soils produce a good crop of one kind, but fail to produce others?
2. What causes the soil to become gradually unfertile?
3. What can be done to improve the fertility of the soil?
4. What is farm-yard manure?
5. What is meant by "exhaustion" of a soil?
6. What is meant by giving the land a "rest"?
7. What do you understand by fallowing?
8. How is fallowing done?
9. What soils are benefited by fallowing?
10. In what case is fallowing not needed?
11. What plants restore nitrogen to the soil? What crops remove it
12. How do clover and lucerne give fertility to a soil?

FIRST STEPS IN AGRICULTURE.

We are in receipt of several communications expressing approval of the series of lessons in elementary agriculture published monthly in the *Journal.* It is a source of gratification to us to learn that many State and other school teachers as well as private persons are making use of these lessons to instruct their pupils in the elements of the science. And not only in this State are they appreciated, but also in other parts of the British dominions. The *Tropical Agriculturist* of Colombo, Ceylon, reprints the lessons as they appear for the benefit of the youth of Ceylon. The first stage will be completed in the next issue of the *Journal*, forming the first of a series of three primers. The second stage will carry the student into a higher sphere, whilst the third will deal with the subject from a more advanced standpoint.

GRASS ENSILAGE.

In the sandy districts of Flanders the principal food of the milking cattle is turnips. In severe seasons these are often frozen, and the cattle would sometimes go very short were it not that there is a great extent of grass land in that country. So rank does this grow that there is far more than enough for the cattle, and it became a question of saving it in some manner other than making it into hay. Baron Peers decided to try turning it into ensilage, and the experiment proved highly successful. This ensilage may be made in different ways, and the method is thus described in the *Farmer and Stockbreeder*:—

Ensilage may be made in different ways: the grass may be buried in a trench hollowed out in the ground, or in a silo built and cemented, or in a rick. The following was the plan adopted at Oostcamp:—The grass was mown for the first time between 8th May and 6th June. As soon as cut it was carried as quickly as possible and placed on the rick. The carrying went on every day except Sunday. The rick contained about 118 loads of grass, of about 22 cwt. each. Care was taken not to put too thick a layer on at a time, so as always to allow the under layer to heat to the requisite temperature of 130 degrees to 150 degrees Fahr. For this reason not more than 1 yard to $1\frac{1}{2}$ yards was added each day. The rick, which was cut 6th November, 1899, measured 13 yards in length, $4\frac{1}{2}$ yards in breadth, and $2\frac{1}{4}$ yards in height. It stands on ground which was previously dug out to 18 inches. The pressure was given by means of old pieces of iron and large blocks of stone, but any other heavy weight would do. Making allowance for the damaged portion—varying from 1 inch to 1 foot of the different surfaces

exposed to the air—the bulk of the rick is 130 cubic yards. On 11th November the weight of a cubic yard of ensilage was taken—1 yard of the upper part weighed 1,000 lb., 1 yard of the middle part weighed 1,400 lb., 1 yard of the lower part weighed 1,500 lb. On an average, a yard weighed 1,300 lb. The total weight, making allowance for the spoilt outsides, was 170,000 lb., or about 75 tons. This quantity constituted a portion of the daily ration of the cattle till the end of February.

POTATOES.

Many farmers take too little care of their seed potatoes. They are hauled to the barn, and either left in the bags until planting time comes round, or they are left in a large heap on the barn floor, with, perhaps, a covering of straw over them. When August or September arrives it is considered time enough to overhaul the heap, bags, or pit, and pick out the rotten ones. Too often the seed is found in a matted condition, owing to the potatoes never having been turned. The large amount of roots has caused them to heat and grow, and the long shoots are all matted together. This necessitates the whole mass being stirred up, which breaks off the majority of the shoots, and the rest have to be picked off by hand. Large numbers are rotten, owing to the few rotted at first not being picked out. All this loss, or at least a great deal of it, might have been avoided by being careful to turn over the seed occasionally. A gain in growth may be brought about by turning them over about a fortnight before planting. New shoots will then form, but they are not long enough to break off in planting, and will be up as early as those which were planted immediately after the last turning. Those left for a fortnight later should not be heaped up in a big pile, nor should they be covered with a great thickness of earth. This keeps away the air, and a quick growth of tender shoots is the result. If they are pitted in the open, the heaps should be long and narrow, and be only covered with just sufficient earth to keep out the wet, or else they may be bagged or spread out thinly in the barn. By these means the shoots will be strong and tough, and should heavy rains come on the seed can be kept for a longer time before planting, without injury.

SPRAYING POTATOES TO PREVENT DISEASE AND TO INCREASE THE YIELD.

Mr. Henry F. Hill of the Agricultural College, Aspatria, Cumberland, writes to the *Farmer and Stockbreeder*, on the subject of spraying potatoes as follows:—

As the season for spraying potatoes is approaching, perhaps a short report of our experiment with last year's crop may interest some of the readers of your journal.

The "Up-to-Date" was the variety experimented on. They were sprayed with Strawsonite for the first time on 17th July, and again on 15th August. Although the spraying was not quite so successful as it usually is in preventing the disease in the tubers, it had a very decided and beneficial effect on their size and the yield of the crop, as may be seen from the subjoined table.

In addition to preventing the disease, spraying has the effect of prolonging the life of the stems or haulms, so that the period of storage for starch and other materials in the tubers is much increased, and, as a natural consequence, the sprayed plots usually yield a larger and a more regular sample than the unsprayed.

The stems of the sprayed potatoes remained green for more than three weeks longer than those of the unsprayed. This lengthened period of growth allowed the medium-sized tubers to become large, and thereby increase the

yield of saleable potatoes to the extent of 2 tons to the acre, which at the present price means a consideration of about £6 per acre, for an outlay of about 30s.

The potatoes were lifted at the end of September, 1900, when an equal area of sprayed and of unsprayed were heaped in separate clamps, which were opened on 10th April, 1901, when the potatoes were duly sorted and weighed, with the following results:—

AMOUNTS PER ACRE.

	Unsprayed. Tons	cwt.	st.		Sprayed. Tons	cwt.	st
Saleable potatoes	7	12	2	...	9	14	0
Seed size ,, ...	1	14	0	...	1	9	7
Small ,, ...	0	9	2	...	0	8	3½
Diseased ,, ...	1	6	2	...	0	15	6
	11	1	6	...	12	8	0½

VALUE OF COTTON SEED TO FARMERS.

The result of two years' feeding experiments with milch cows to determine the value of cotton seed to farmers is reported to the Agricultural Department in a bulletin of the Mississippi station. The following is a summary of the report by the editor of Farmers' Bulletin No. 124:—

The facts as demonstrated are: (1) A pound of cotton seed has a greater value for feeding cattle than 1 lb. of corn; (2) 1 lb. of cotton-seed meal has a feeding value about equal to 2 lb. of corn; (3) that at least 85 per cent. of the fertilising ingredients in the feeds is excreted by the animals fed, and may be recovered in the manure; (4) that nearly half of the fertilising ingredients excreted is found in the urine; (5) that both cotton seed and cotton-seed meal may constitute a very important part of the grain feed of cattle without injury to their health; (6) that cotton seed and cotton-seed meal, when fed to dairy cows in proper quantity and properly combined with other feeds, do not injure the quality of either milk or butter.

With corn at 40 cents (1s. 8d.) per bushel (about the average price in this State), a ton of cotton seed is worth $16·70 (£3 9s. 7d.) as a feed for either beef cattle or dairy cattle. At present prices for commercial fertilisers, nitrogen costs about 12 cents (6d.) per lb., and phosphoric acid and potash each 5 cents (2½d.) per lb. Allowing these prices for the same ingredients in manure, we have $9·09 (£1 17s. 10d.) as the fertilising value of the manure for each ton of seed fed, making for a farmer a total value per ton of $25·79 (£5 7s. 5d.). Farmers sell their seed for $4 to $6 (16s. 8d. to £1 5s.) per ton. Some of them sell for $2 (8s. 4d.) per ton.

In a similar way, we find the feeding value of a ton of cotton-seed meal to be $28·56 (£5 19s.), and the manure to be worth $19·13 (£3 19s. 8d.) for every ton of meal consumed, making a total value of $47·69 (£9 18s. 8d.) that a farmer might derive per ton by first feeding the meal to the cattle and applying the manure to his land. The cotton crop for the south (in 1897-98) was 11,200,000 bales and 5,600,000 tons of seed, having a combined feeding and fertilising value of $144,424,000 (£28,885,000). At $5 (£1 0s. 10d.) per ton, the seed would have brought $28,000,000 (£5,600,000). The farmers of the cotton belt lost $116,424,000 (£23,284,800) on this one crop.

The present disposition of the cotton-seed crop secures to the farmer a very small part of its real value, and must of necessity give place to a practice that will secure to the farmer the maximum benefit which he may derive from this product. The time will come when the southern farmer will realise that the fertilising value in cotton seed must stay on the farm to maintain its fertility and productiveness.

He will not always regard the matter of hauling as of no consequence—as something which he can do without cost. If the best disposition of cotton seed is finally demonstrated to be to extract the oil for human food and other commercial purposes, and let the meal and hulls go back to the farms to serve both as feed and fertiliser, then, most likely, there will be a small oil mill at each ginnery, and oil and lint will be the only products of the cotton crop sent to the market.

The southern farmer, however, need not wait for oil mills. He may get the full value of his cotton seed by a judicious system of feeding, accompanied by the most careful saving and proper use of the manure.—*Florida Agriculturist.*

DECORTICATED COTTON-SEED CAKE FOR STOCK.

Mr. G. Middlemiss writes:—In your highly interesting and instructive report of the recent Bundaberg Conference, I observe an illustration used by Dr. Maxwell when dealing with sorghum poisoning, which reminds me of an experience with decorticated cotton cake, in the North of England, on the Greenwich Hospital Estate.

I think the matter important enough to find a place in your journal.

Prime fat cattle, at the time I write of, were selling at 1s. per lb. by the carcass, consequently stores were high-priced, and every farmer was anxious to raise calves, even though most of his land might be under tillage; this necessitating supplementary feed for the rearing of the young stock, and, amongst other things, decorticated cotton cake was tried.

Owing to the presence of an acrid poison, it was found to be hurtful to very young stock, and after some loss during the experimental stage, its use was discontinued with these, though it proved to be a most valuable food adjunct for older cattle, liable at first to set up scour, but afterwards, having rather an astringent tendency.

I well remember testing the effects of a porridge of crushed decorticated cotton cake on a number of hungry young ducks, and the way in which it knocked these over, with a contingent of sparrows also, which came unbidden to the feast, and which shared the same fate, was enough to convince me that cotton-seed meal or cake was unsuitable for young stock.

[Mr. Middlemiss' communication would give rise to the supposition that if decorticated cotton-seed cake will kill sparrows in England, it might be equally effective on their Australian descendants. At all events it would be easy to make the experiment.—Ed. *Q.A.J.*]

KEEPING ONIONS.

In an article on this subject published in the *Révue Générale Agronomique*, mention is made of an observation of great importance which deserves the attention of farmers, gardeners, and amateurs. After some experiments made on ten plots manured with chemical fertilisers, the resulting crops of onions were put away in bags and carefully numbered with a view to planting them out in the following spring to obtain seed from them. When the time for planting had arrived, it was found, to the astonishment of all concerned, that, under identical conditions of temperature and light, certain lots had sprouted and were exhausted by young, premature shoots, whilst the other lots still remained hard and solid without a trace of a shoot. The collections having been carefully ticketed, it was easy to prove that the produce from plots deprived of sulphate of potash were exhausted by a too hurried vegetation, whilst that which had received the potash manure was perfectly preserved.

Such experiments are well worth repeating, and it would be to the advantage of the agricultural world if those few advanced farmers who make such trials of fertilisers would publish the results of their experience.

THE EFFECTS OF ROLLING ON THE POWER OF CEREALS TO RESIST "LODGING."

The results of some interesting research conducted by Dr. Von Seelhorst at the Experiment Station of Göttingen University have just been published in the *Journal für Landwirthschaft*. The experiments consisted in discovering what immunity from "lodging," the act of rolling young grain crops was able to give. In 1898 a certain field of about 2 morgen* had oats put in after roots. The oats were drilled on 7th April; 150 lb. (G.) † of basic slag per 1 morgen were applied, and on 14th May a top-dressing of nitrate of soda, 50 lb. to the morgen, were put on. The young crop suffered badly from wireworm. In order to restrict subterranean movement, and thus as much as possible minimise damage to the crop, a heavy smooth cylinder roller was set to work. Whilst rolling was proceeding it started to rain, and interrupted the operation. Wet weather continued for some time, and prevented the rolling being completed. About half the field remained unrolled; the crop at the time was about 15 c.m.‡ high.

About four weeks before harvest the utility of the rolling became clearly evident. Heavy downpours of rain smashed down the oats where no rolling had been done. On the rolled half of the field not a straw went down. In spite of the "lodging" of the unrolled oats, a very high yield was obtained: 25·25 centners§ per 1 morgen. Unfortunately, through an oversight, the separate determination of the two halves of the field was not made. But it was obvious, without measurement, that the rolled portion contributed considerably more than its proper share to the result.

In reflecting on the result of this experiment, the influence of the roller in curtailing the damage done by the wireworm should not be left out of mind.

Last year (1900) the experiment was repeated, and carried out in greater detail. On another field, also about 2 morgen in extent, wheat followed potatoes. Seed to the quantity of 78 lb. (G.) per 1 morgen had been put in on 11th October, 1900. Two centners of Peruvian guano were applied. The wheat wintered well. It was rolled on 2nd April, and twice harrowed on 23rd April. On 15th May, when the wheat was about 20 c.m. high, one half of the plot was again rolled with a medium-weight "Crosskill." A short time previously a top-dressing of nitrate of soda, at the rate of 50 lb. (G.) to 1 morgen, had been so put on that the field was now divided as follows:—

Plot A. Rolled, without top-dressing.
,, B. Rolled, with top-dressing.
,, C. Unrolled, without top-dressing.
,, D. Unrolled, with top-dressing.

Although no real damage had accrued to the plots A and B (they reared themselves immediately after being rolled), they were soon left behind by C and D in growth and development. Plot A remained backward throughout the entire period of growth; whilst plot B, which had received a dressing of nitrate, gradually caught up with plots C and D.

Heavy rains came. On 29th July plot D went down; plot C followed suit the day after. Eventually, on 4th August, plot B "lodged" slightly; plot A remained standing. It is stated that the "lodging" of the wheat, as also of the oats, was due, not to beating down of the straw (*i.e.*, to no debility in the haulm), but to the softening of the water-sodden soil, which was then no longer able to give the root-base of the plant sufficient hold.

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* 2 morgen = 1 hectare = 2·47 acres.
† 1 lb. (German) = $\frac{1}{2}$ kilogram = 1·102 lb. (English).
‡ 1 c.m. = $\frac{1}{100}$th metre = 0·397 in.
§ 1 centner = 100 lb. (G.) = 110·2 lb. (E.).

The field was harvested on 14th August, and the results in yields per 1 morgen were found to be as follows:—

Plot A. Rolled, without top-dressing	...	17·96 centners.
,, B. Rolled, with top-dressing ...	...	20·66 ,,
,, C. Unrolled, without top-dressing	...	19·84 ,,
,, D. Unrolled, with top-dressing...	...	19·36 ,,

In explanation of these results, Dr. von Seelhurst writes in effect:—"The rolled plots had, as already stated, been retarded in their development. Since no injury to the plants had been committed, the only possible conclusion is that the consolidation of the soil decreased its powers of nitrogen-elaboration, resulting in a less luxuriant plant growth. In this way the danger of 'lodging' was averted. In addition, the plants in the compressed soil will, without doubt, have had a firmer hold. The result of the less vigorous development was a relatively smaller harvest in the case where the decreased supply of available soil-nitrogen was not compensated for by a nitrogenous top-dressing. Where this was given, however (plot B), the dressing could only produce its invigorating effect slowly, in consequence of the compactness of the surface-soil, so that at first the growth was sluggish. The consolidation of the soil (in plot B) militated against 'lodging' in a high degree. The final result under such conditions could not be otherwise than a comparatively high return. On the unrolled plots, in consequence of good aeration, nitrification was very active, producing generous growth. Indubitably these conditions would have led to a larger yield if 'lodging' had not ensued, this being partly due to the luxuriant development of the plants, and partly to the insufficient hold upon the soil possessed by the roots. In the case of plot D, where the top-dressing of nitrate of soda had encouraged a growth already rich, 'lodging' naturally took place earlier than on plot C."

These two experiments are isolated, but it seems probable that further research, carried out under different conditions, will tend to support them and the conclusions that they give rise to. Put in brief these conclusions are:—

(1.) That rolling wheat or oats when from 6 inches to 8 inches high diminishes the tendency towards lodging in two ways—

(*a*) Firstly, by retarding nitrification and thus preventing a too luxuriant growth.

(*b*) Secondly, by consolidating the soil and securing a firm hold for the roots.

(2.) That rolling without a top-dressing of a nitrogenous manure, to counterbalance the decreased amount of nitrogen becoming available for plant food, results in a smaller yield than that obtained on unrolled plots.—*Agricultural Gazette*, London.

NEW DRESSING FOR CEREALS.

In a bulletin issued by the Agricultural Experiment Station of the Wisconsin University, we find a very favourable account of a new dressing for seed wheat, barley, and oats as a preventive against smut. This fungoid disease is described, as well as experiments made with "formaldehyd," which is a remedy against the kind of smut known as "stinking" smut. The bulletin then says:—

Various methods have been used to prevent smut in the small grains, but the method now acknowledged to be best is that known as the "formaldehyd" treatment. This consists in sprinkling the seed with a 40 per cent. solution of formaldehyd gas, according to the directions given in this bulletin.

Formaldehyd is a colourless, pungent gas obtainable from wood alcohol and readily soluble in water. It may be purchased at drug stores in liquid

form—that is, dissolved in water. Its property of destroying the spores of fungi was discovered by the German scientist Loew, in 1888. It is not poisonous in moderate amounts, even when taken internally. In 1895 Professor H. L. Bolley, then of Indiana, but now of the North Dakota Experiment Station, began making experiments with a solution of formaldehyd for the prevention of grain smuts and potato scab. His results were so satisfactory that the formaldehyd treatment has come to be regarded as the standard preventive for these diseases.

Does it Pay to Treat Grain to Prevent Smut?—Suppose a farmer raises 25 acres of oats, and receives a yield, without treating the seed, of 40 bushels per acre. His crop would be 1,000 bushels. Suppose 5 per cent. of the heads in this crop were destroyed by smut. His crop would have been a fraction over 1,052 bushels had he prevented the smut. In other words, he would have received 52 bushels of oats for treating the seed. If oats are worth 25 cents (1s. 0½d.) per bushel, the gain would have been 13 dollars (£2 14s. 2d.). How much would it have cost to treat the seed? The account would stand about as follows:—

Dr.			Cr.		
To 1 lb. formaldehyd	$·60	(2s. 6d.)	By 52 bushels of oats at 25 cents	$13·00	(£2 14 2)
To 4 hours work at ·15	·60	(2s. 6d.)	Less cost of treating	1·20	(5 0)
Total	$1·20	(5s.)	Net profit ...	$11·80	(£2 9 4)

How to Treat the Seed.—Buy, at a drug store, 1 lb. of 40 per cent. formaldehyd for every 50 bushels of grain it is desired to treat. Ascertain at once if your druggist has it. to give him time to procure it if he has not. Pour 1 lb. of the formaldehyd solution into a barrel containing 45 gallons of clean water. Then place a layer of grain 3 or 4 inches thick on the barn floor, and sprinkle this with the solution until all the grains are entirely wet. A garden sprinkler is good for this work. Then place another layer of grain on the first layer and sprinkle as before, repeating the process until all the seed has been sprinkled. Leave the grain in the pile two hours, then spread out thinly to dry. It should be shovelled over once or twice a day until dry. If it is to be sown broadcast, it is not necessary to dry it.

Corn (mealies) smut cannot be prevented by treating the seed corn, as the disease is of a different nature from the other grain smuts.

In case more grain is treated with the formaldehyd solution than is needed for sowing, the excess may be safely used for feeding by mixing it with ten times its bulk of untreated grain.

Formaldehyd for Potato Scab.—Formaldehyd may also be used to lessen damage from potato scab. Immerse the unsprouted and uncut seed potatoes for two hours in a solution made by adding ½-lb. of 40 per cent. formaldehyd to 15 gallons of water. If the tubers are deeply scabbed, extend the time to three or four hours. After treatment, cut the tubers in the usual manner. They may be handled freely without danger. The same solution may be used five or six times in succession if the treatment is continued a little longer each time.

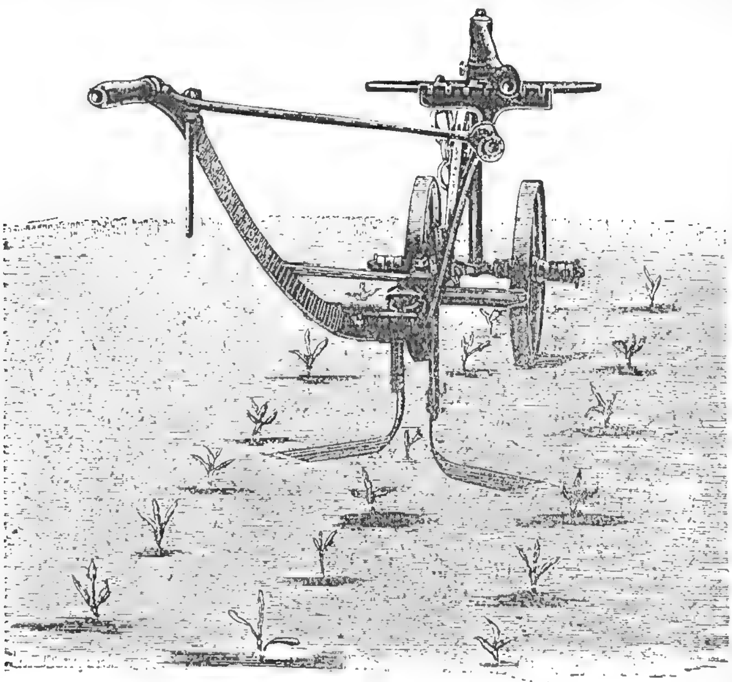
RECENTLY PATENTED AMERICAN INVENTIONS.

Amongst the latest agricultural implements patented in the United States is what is called "a replanter attachment for cultivators." By means of this simple replanting attachment, which can be readily applied to any cultivator, and operated from the handle, a "set" of corn can be instantly and accurately dropped in a lost hill and added to one thinly planted during the cultivation of the field. At one movement of the operator's hand, a few seeds or grains are dropped on the ground, the furrow having been previously opened for the seed. The dropped seed is covered and rolled. Another invention provides a plough

for use in working cotton for the first time. The plough or cultivator embodies two disks which run on opposite sides of the row, together with devices whereby the angle of the disks may be varied to make the disk run deep or shallow as may be required. A third is "a device for operating markers of corn planters" adaptable to any corn planter, whereby the marker can be quickly raised by the foot of the driver and freed from any trash which may have been gathered. Thus, a plain mark is made during the planting, and the work of straight planting is facilitated. The device is also serviceable in raising the marker to clear a rock or stump.

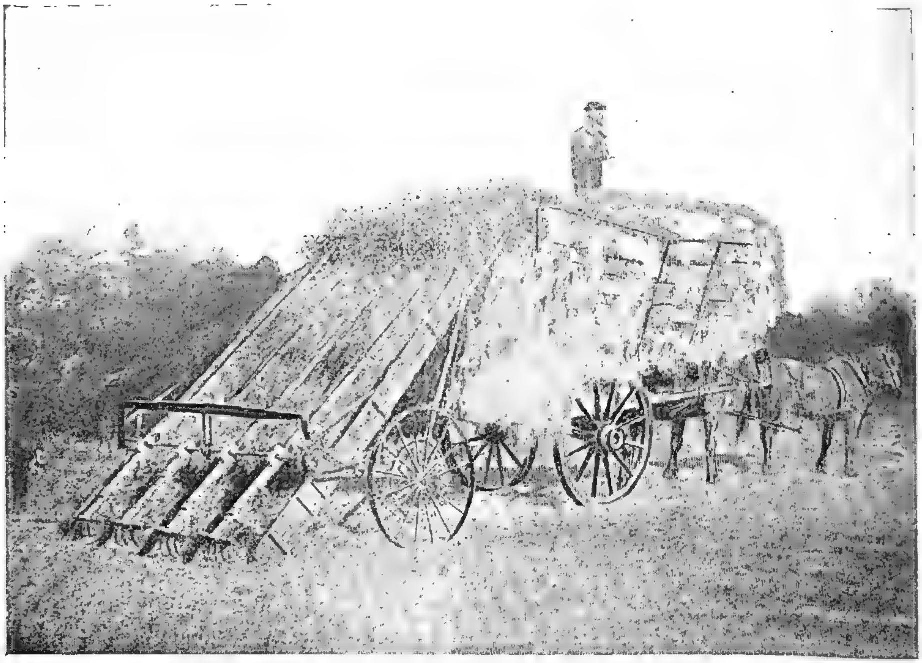
PATENT STEERAGE HORSE-HOE.

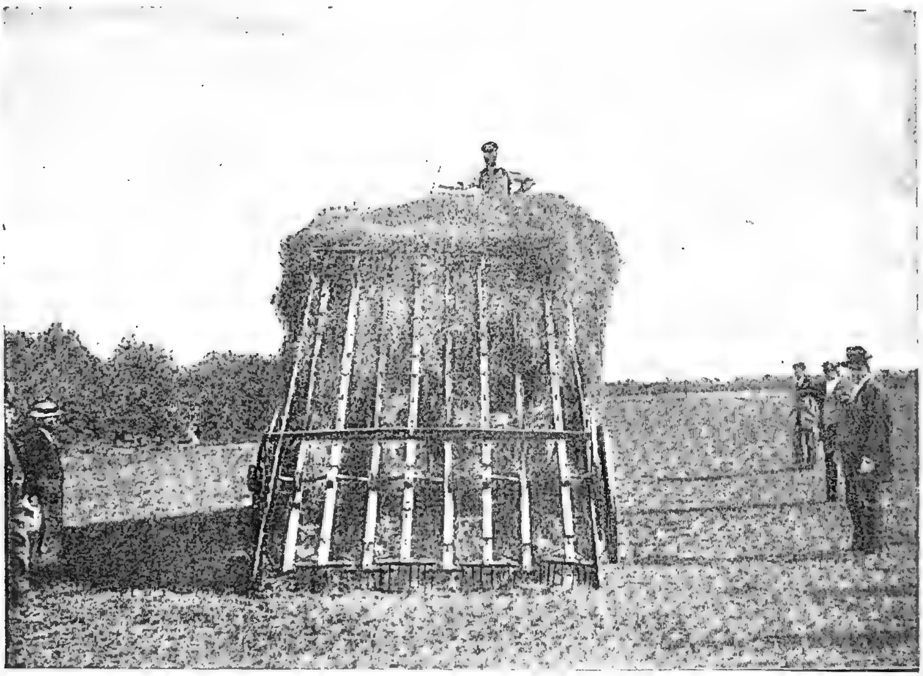
The *Mark Lane Express* says that Messrs. Carson and Toone's (Warminster, Wilts.) patent steerage horse-hoe is an important improvement on the ordinary horse-hoe. The design of the hoe is the same, with the addition of the steerage and improved blades for early hoeing. It is adapted for side-hoeing roots and plants either on the ridge or flat, thus doing away with expense of hand side-hoeing. The travelling wheel stand has a draught bar provided with notches to allow the draught attachment to be shifted to either side; a steering rod having a rack is situated within easy reach of the operator's



hand to enable him to move the travelling wheels at will, and so cause the wheels and hoe blades to follow the track of the rows of plants irrespective of any slight deviation of the same, in the course followed by the horse, or any other cause. The horse, walking between the rows or plants, does not damage them, and the driver is not obstructed in his view of the plants by the horse. The wheels are adjustable to suit the width of rows or drills, and the hoe can be used immediately the plant appears, as the improved blades cannot injure the plant; the weeds, &c., being cleared away by the blades, leave a light soil immediately round the plant, greatly promoting the growth.

Plate VIII.

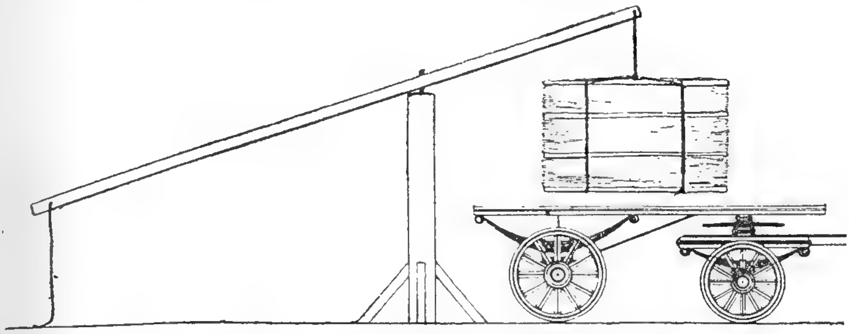




THE OHIO HAY-LOADER.

LOADING FORAGE.

In the United States every advantage is taken of appliances tending to save labour on the farm. How few such appliances do we see on a Queensland farm. Now, here is a very simple contrivance which we used ourselves some years ago for loading bags of corn and bales of cotton onto a wagon. An almost identical idea is given in the July number of *Station, Farm, and Garden*, the only difference being that our post was fixed in the ground at a convenient spot near the ginning-house, whilst the other is a fixture at either end of the



wagon. The fixed post is better because it can be utilised for any description of conveyance. What gave us the idea was simple enough—it was the ordinary see-saw of our school days. A heavy boy at one end raised the lighter one high into the air. From this originated the cotton-bale loader. The illustration explains itself, except that the slotted hole in the pole is not shown. It must be slotted to enable the pole to work on the pin at the head of the post. The pole should be about 20 feet long, and the post from 5 to 6 feet in height.

THE OHIO HAY-LOADER.

Amongst the many labour-saving appliances by which our American brethren make farming successful is a hay-loader called "The Ohio," manufactured by the Ohio Rake Company, Dayton, Ohio, U.S.A. This loader, which was awarded a silver medal in England, not only picks up the hay from the swathe as well as from the window and lifts it on to the wagon, but rakes the ground comparatively clean, leaving very little for the horse-rake to gather. It will pick up clean, and load on to the wagon, a ton of hay in ten minutes if the crop is a good one, with only one man on to load and a boy to lead the horse, so that a boy and a man can clear any field without further assistance, excepting the lad to work the horse-rake for cleaning up the little that is left.—*Mark Lane Express.*

SCHOOL HOLIDAYS IN RURAL DISTRICTS.

In the days when cotton was king in Queensland, numbers of boys and girls were employed in cotton-picking. The money earned by the children was a welcome addition to the income of the small farmer and his married hands. But cotton-picking interfered to some extent with school work. Consequently, if we mistake not, the school holidays were so arranged that the children were enabled to devote a considerable portion of the season, between March and June, to the cotton-fields, whilst there was no diminution in the number of school hours during the year.

Although we have, as yet, no cotton-fields demanding youthful hands, we have considerable areas of strawberries, which must be picked as they ripen

between July and October. Strawberry-pickers are scarce amongst the adults of a district, and when such pickers are obtained, some will work on an orchard so long as the berries are plentiful; but, as soon as the main heavy crop is picked, they leave one place to go to another where the fruit is in greater abundance, leaving their first employer to get through the rest of the season as best he may. The remedy for this undesirable state of affairs is either to pay a fixed daily wage to young people, or to enter into a binding contract with adult pickers, so as to ensure the whole crop being taken off.

Here, again, the school question comes in, and the difficulty might be met as in the case of cotton-picking.

At Brafferton, in Yorkshire, a meeting was lately held in the schoolroom to consider the advisability of altering the time of the summer holidays so as better to suit modern requirements in regard to agricultural labour. The leading farmers in the district attended. After a short discussion, it was unanimously decided that as there is now but little work for children in the harvest field, the holidays, instead of being continuous through August, should be divided into two portions, a fortnight being given in July, so as to enable the children to enjoy themselves in the long summer days, and four weeks from the middle of September, so as to liberate boys to work during the season of potato gathering. A vote of thanks was passed to the teachers for their willingness to forego the enjoyment of a long unbroken holiday for the sake of the greater advantage which it was hoped would thus accrue to the children. This example might very well be followed in various other parts of the country.

From the above, it will be seen that the only sufferers by a re-arrangement of holidays are the teachers, who have to forego their long holidays at mid-summer in order that the school time may suffer no diminution.

When we have coffee, cotton, strawberries, and native gooseberries to pick, perhaps some such arrangement as we have indicated may be made in the interests of the farmers and orchardists with no detriment to their children's school work.

SPELT IN MANITOBA.

A new grain which has been grown to a limited extent in Manitoba this year is called spelt. It is said to be a Russian grain, and is grown in that country, and in Germany. The seed was obtained from a foreign settlement in Dakota. It was sold in Winnipeg last spring by W. G. Douglas, grain-dealer, to a number of farmers throughout the province. Mr. Douglas has received reports from the farmers who grew this grain last summer, and they all speak very favourably of it. Though the season was a trying one, it produced good crops, as much as 50 bushels being obtained from one bushel of seed. It is claimed of spelt that it produces a heavy crop, is easily grown, stands drought much better than most other grains, ripens early, and makes a superior feed grain for animals. The straw is also said to be better for feed than straw of other grains grown in Manitoba. It is claimed that spelt is a feed grain, in appearance resembling something between wheat and rye when shelled. The berry, however, is held in a tough husk, and does not shell like wheat in thrashing. Two berries grow together in the head.

The above, which we take from an American exchange, gives the impression that spelt is a hitherto unknown grain. As a matter of fact, it has been grown in Queensland (at Killarney, we believe) some years ago, the seed having been imported by the Department of Agriculture, and distributed to some German farmers for trial. It succeeded very well, but we do not think our farmers would benefit much by growing it for flour-making purposes, as the flour produces the black bread, almost like rye-bread, so much used in Germany and Russia. Wheaten flour is within reach of the smallest farmer in Queensland, consequently, as human food, there is no necessity for the introduction of spelt. As a fodder plant for cattle, however, there seems to be a good opening for it, and it might be worth a trial on that account alone.

Dairying.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 30th June, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Rosebud ...	Ayrshire... ...	10 April, 1900	420	3·9	18·34	
Ream ...	"	24 July "	105	3·8	4·46	Dry, 20-6-01
Isabelle ...	"	7 July "	155	3·7	6·34	Dry, 30-6-01
Leesome ...	"	1 Sept. "	553	3·7	22·91	
Ream Routhie	"	20 Sept. "	72	3·7	2·98	Dry, 15-6-01
Ruth ...	"	8 Oct. "	404	3·6	16·28	With first calf
Laura ...	"	28 Aug. "	441	3·8	18·76	With first calf
Renown ...	"	29 Nov. "	456	3·8	19·4	With first calf
Ruby ...	"	9 April, 1901	533	3·6	21·49	With first calf
Blink ...	"	2 Feb. "	814	3·5	31·90	
Annie Laurie	"	25 April "	901	3·6	36·32	
Bonny ...	"	12 April "	540	3·6	21·77	
Linnet ...	"	7 May "	1,005	3·7	41·64	
Baroness ...	Jersey	3 Aug., 1900	304	5·2	17·70	
Playful ...	"	14 July "	411	4·1	18·87	
Carrie ...	"	18 Aug. "	180	5·4	10·88	With first calf
Spec ...	"	26 Aug. "	60	5·0	3·36	Dry, 12-6-01
Stumpy ...	"	29 Aug. "	545	4·5	27·46	
Evileen ...	"	2 Sept. "	451	5·0	25·25	
Connie ...	"	8 Sept. "	443	4·5	22·32	
Bashful ...	"	2 Nov. "	230	5·2	13·39	
Effie ...	"	6 Jan., 1901	512	4·3	24·65	
Content ...	"	8 June "	365	4·2	17·16	
Russet ...	Grade Shorthorn	7 Oct., 1900	120	3·7	4·97	Dry, 20-6-01
Alice ...	" " ...	13 Nov. "	572	4·1	26·26	
Stranger ...	" " ...	7 July "	455	3·8	19·36	
Restless ...	" " ...	3 Sept. "	476	3·6	19·19	
Rosella ...	" " ...	5 Sept. "	495	3·6	19·95	
Lucy ...	" " ...	27 Sept. "	164	3·8	6·97	Dry, 28-6-01
Leopard ...	" " ...	29 Sept. "	95	3·7	3·93	Dry, 16-6-01
Redmond ...	" " ...	12 Sept. "	60	3·8	2·55	Dry, 12-6-01
Rusty ...	" " ...	23 Dec. "	195	3·9	8·51	Dry, 28-6-01
Ginger ...	" " ...	19 Dec. "	546	3·8	23·23	
Polly ...	" " ...	21 Feb., 1901	514	3·6	20·72	
Princess May	" " ...	25 May "	570	5·0	31·92	With first calf
Peggie ...	" " ...	29 May "	722	3·7	29·91	
Clara ...	" " ...	14 June "	304	3·8	12·93	With first calf
Kit ...	Shorthorn ...	28 Sept., 1900	453	3·6	18·26	
Violet ...	"	9 Oct. "	482	3·6	19·43	
Louisa ...	"	6 April "	74	3·8	3·14	Dry, 15-6-01
Plover ...	"	3 July "	470	3·8	20·0	
Frizzy ...	"	23 Aug. "	160	3·7	6·63	Dry, 28-6-01
Laurel ...	"	10 Sept. "	235	3·7	9·73	Dry, 30-6-01
Empress ...	"	20 Nov. "	168	3·7	6·96	Dry, 25-6-01
Curly ...	"	10 Dec., 1899	516	3·8	21·96	
Roany ...	"	17 Mar., 1901	452	3·3	16·70	With first calf
Cherry ...	"	11 April "	425	3·6	17·13	With first calf
Rose ...	"	10 April "	455	3·5	17·83	With first calf
Gladdy ...	"	29 April "	815	3·5	31·94	
Queenie ...	"	19 May "	750	3·6	30·24	
Maggie ...	"	20 May "	725	3·7	30·04	
Countess ...	"	18 June "	254	3·7	10·52	
Olga ...	"	19 June "	180	3·6	7·25	With first calf
Dora ...	"	2 June "	552	3·7	22·87	With first calf
Dott ...	"	31 May, 1901	590	3·4	22·46	With first calf
Fancy ...	South Coast ...	21 May, 1900	90	4·1	4·13	Dry, 15-6-01
Grace ...	" " ...	15 June, 1901	307	4·5	15·47	With first calf
Pansy ...	Grade Jersey ...	4 Dec., 1900	383	3·7	15·87	With first calf
Damsel ...	Holstein	19 Jan., 1901	711	3·2	25·48	
Dairymaid ...	"	3 Mar. "	844	3·1	29·30	
Lady Rose ...	Guernsey ...	15 April "	454	3·5	17·79	With first calf

MILK TESTS AT WIDE BAY AND BURNETT PASTORAL AND AGRICULTURAL ASSOCIATION'S SHOW, MARYBOROUGH.

11TH AND 12TH JULY, 1901.

FIRST DAY.

	Name of Owner.	Name of Cow.	Lb. of Milk.	Per Cent. Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. Fowler	Royal	14½	3·5	·56
	Mr. Summers	Spitfire	13¼	4·2	·62
	Mr. Fowler	Victoria	17½	3·5	·68
	Mr. Hockley	Bessie	5½	5·2	·32
	Mr. Fowler	Princess	20¾	3·6	·83
	Mr. Fowler	Lady	17¼	3·9	·75
Evening.	Mr. Fowler	Royal	11¼	4·6	·57
	Mr. Summer	Spitfire	12¼	4·0	·54
	Mr. Fowler	Victoria	13½	4·0	·60
	Mr. Hockley	Bessie	5	5·6	·31
	Mr. Fowler	Princess	14¾	4·0	·66
	Mr. Fowler	Lady	12½	4·2	·58

TOTALS FOR FIRST DAY.

	Royal.	Spitfire.	Victoria.	Bessie.	Princess.	Lady.
First Day ...	1·13	1·16	1·28	·63	1·49	1·33

SECOND DAY.

	Name of Owner.	Name of Cow.	Lb. of Milk.	Per Cent. Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. Fowler	Royal	13	3·6	·52
	Mr. Summers	Spitfire	15¼	3·9	·66
	Mr. Fowler	Victoria	17½	3·4	·66
	Mr. Hockley	Bessie	6½	5·2	·37
	Mr. Fowler	Princess	18½	3·4	·70
	Mr. Fowler	Lady	16¼	3·9	·72
Evening.	Mr. Fowler	Royal	11¼	4·6	·58
	Mr. Summers	Spitfire	12¾	4·4	·62
	Mr. Fowler	Victoria	14½	3·9	·63
	Mr. Hockley	Bessie	5	5·6	·31
	Mr. Fowler	Princess	14	4·0	·63
	Mr. Fowler	Lady	12½	4.2	·58

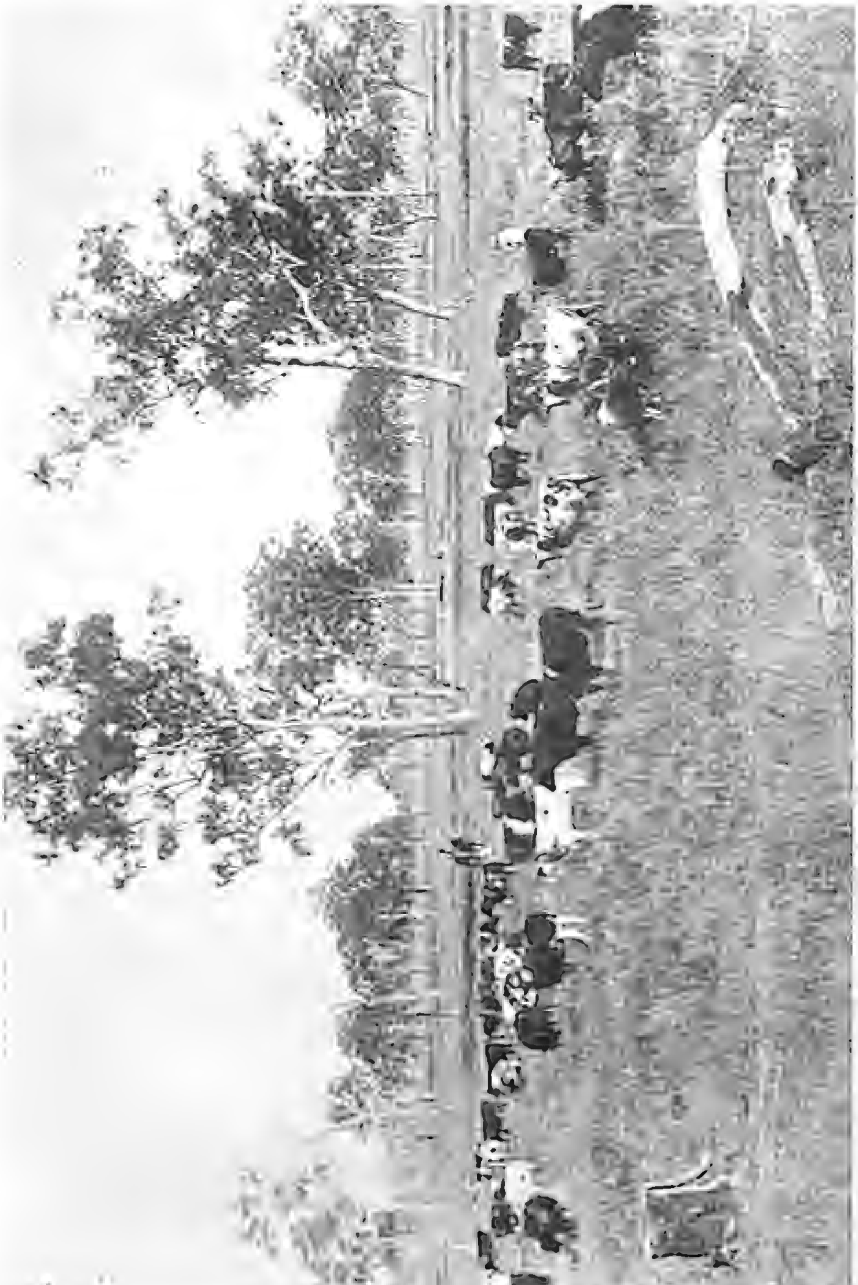
TOTALS FOR SECOND DAY.

	Royal.	Spitfire.	Victoria.	Bessie.	Princess.	Lady.
Second Day	1·10	1·28	1·29	·68	1·32	1·30

GRAND TOTALS OF COMMERICAL BUTTER IN ORDER OF MERIT.

	Princess.	Lady.	Victoria.	Spitfire.	Royal.	Bessie.
First Day ...	1·49	1·33	1·28	1·16	1·13	·63
Second Day	1·32	1·30	1·29	1·28	1·10	·68
Total ..	2·81	2·63	2·57	2·44	2·23	1·31

Plate IX.



College Dairy Herd—Dry Stock.

Plate X.

STUD BULLS AT THE QUEENSLAND AGRICULTURAL COLLEGE.

Guernsey. Jersey. Shorthorn. Friesian. Ayrshire.

MILK TESTS AT ROCKHAMPTON AGRICULTURAL SOCIETY'S SHOW, 4TH JUNE, 1901.

—		Morning.			Evening.			—
Name of Owner.	Name of Cow.	Lb. of Milk.	Per cent. of Butter Fat.	Lb. Commercial Butter.	Lb. of Milk.	Per cent. of Butter Fat.	Lb. Commercial Butter.	Totals.
Messrs. Archer Bros.	Rosebud ...	22	5·0	1·220	12¾	5·2	·742	1·962
Ditto	Miss Hoyle ...	16¼	5·2	·945	11¼	5·3	·667	1·612
Mr. J. Grace	Beauty ...	16¼	3·0	·545	9½	3·0	·319	·864
Messrs. Archer Bros.	Queenie ...	15	4·2	·705	12½	4·9	·685	1·390
Ditto	Rosette ...	11¾	4·7	·618	8½	5·4	·514	1·132
Mr. J. S. Henderson	Lovely ...	19	2·2	·467	17	3·8	·723	1·190
Messrs. Archer Bros.	Blackbird ...	12½	3·9	·545	9½	3·8	·404	·949
Hospital	Strawberry ...	14¼	2·9	·462	12¾	3·8	·542	1·004
Messrs. Archer Bros.	Ladybird .	8¾	5·0	·488	6¾	4·4	·332	·820

POINTS ALLOTTED.

Name of Cow.	Time in Milk.	Weight of Milk.	Weight of Butter.	Points Deducted.	Total.
Rosebud	4	34	39	...	77
Miss Hoyle	1	27	32	...	69
Beauty	14	25	17	...	56
Queenie	1	27	28	...	56
Rosette	6	20	23	...	49
Lovely...	0	36	23	10	49
Blackbird	3	22	19	...	44
Strawberry	5	27	20	10	42
Ladybird	2	15	16	...	33

COPY OF CONDITIONS UNDER WHICH POINTS WERE ALLOTTED AT ROCKHAMPTON AGRICULTURAL SOCIETY'S SHOW, 4TH JUNE, 1901.

1 point for every ten days since calving, deducting the first forty days, with a maximum of 14 points.

1 point for every lb. of milk, taking the average of two days' yield.

20 points for every lb. of marketable butter indicated according to the Babcock test.

Deductions will be made of 10 points each time the fat is below 3 per cent.

In any case of cows obtaining the same number of points, the advantage will be given to that cow which has been longest in milk.

No prize will be given to cows under five years old which fail to obtain 25 points, or to cows five years and over which fail to obtain 30 points.

Owners when entering their cows are requested to state in nomination-papers:—

(*a*) Name of cow.
(*b*) Her age.
(*c*) Her breed.
(*d*) Date of last calving.
(*e*) Number of days she has been in milk.

JERSEYS FOR THE DAIRY.

Mr. Alfred Gorrie, "Carina," writes as follows, on the subject of the best dairy cow, to the *Queensland Times*. We purposely omit the controversial portion of his letter. The rest is well worthy of the attention of dairy farmers:—

"A cross," he says, "between the shorthorn and Ayrshire is practically the breed now used by the average dairyman—at any rate, shorthorn blood predominates in the average dairy herds of the State, and the average annual production per cow is too shockingly low to publish. Suffice it to say that if the average dairymen kept the scales and the tester on their cows for the year, they would find that more than half of them did not pay for the attention bestowed on them and the room they occupied, much less the food they consumed. Jerseys have proved themselves valuable dairy animals all over the world. Originating on a small out-of-the-way island, they would never have been heard of except for their special dairy excellence. The Americans, who love dollars and everything that produces them, have given the Jersey first place in all their great dairies, not out of mere sentiment—for that doesn't go far with such practical people—but because she had demonstrated her superiority over all other breeds in a butter-producing capacity.

That they had not misplaced their confidence in the breed was afterwards proved at the ninety-day test held at the World's Fair in 1893, to which I will refer later on. I could mention some great yields of milk and butter from Jerseys in Queensland other than my own, but, as they are individual cases, I will not refer to them. From my foundation cow, I sold to my grocer 12 lb. of butter per week, besides using a certain quantity of milk night and morning for table use; and this by hand-skimming, and before the separator was introduced into Queensland. She is now seventeen years old, and it would still take a very good shorthorn-Ayrshire cross to equal her year's butter production. That cow has been milking for fifteen years, with but four to five weeks' spell each year before calving. Surely the breed that produced such a cow should not be considered a bad breed for the dairy. I keep a considerable herd, and my worst cow produces 250 lb. of butter per year. Let dairymen who keep the shorthorn-Ayrshire cross start to cull out all that do not come up to 250 lb. of butter per year, and I am satisfied that they will very quickly reduce their herds, and then they would only have cows equal to my worst Jersey.

All dairy breeds competed for the £100 butter-test prize offered by the Royal Society of Victoria last year, and the winner was found to be a full-blooded Jersey producing 2·4 oz. of butter in the twenty-four hours. This was not equal to her home test of 2·10 oz. of butter made by the churn just prior to the show. The second, third, and fourth cows were all full-blooded or grade-Jerseys, while the shorthorns were a long way down on the list.

The most interesting tests ever conducted to prove the value of the different breeds for the dairy were at the World's Fair, where each breed was represented by twenty-five cows at a ninety-day test. The first test was for cheese (fifteen days). The result of this was most gratifying to Jersey breeders, as they gained a complete victory in every way. While few believed the Jersey cow was, *par excellence,* not only the best butter cow, but also the best cheese cow, it was not generally conceded that this was the case, and it remained for this test to prove, in a most conclusive way, that she was not only the queen of the churn, but also of the cheese vat. As was demonstrated, the Jersey herd not only gave more milk than the other breeds, exceeding the Guernseys in fifteen days by 2,357 lb., and the shorthorns by 1,109 lb., but the milk contained not only more fat, but also more solids other than fat, so that the milk made more cheese per 100 lb. than that of the other breeds. The quantity of cheese produced by the Jerseys exceeded that of the Guernseys by 34 lb., and the shorthorns by 374 lb. The Jerseys not only made more cheese, but scored most points for texture and keeping quality. The next award was "for individual cow in any breed competing which yielded the greatest net profit during the

test," and the Jersey, Ida Marigold, won by a very strong lead. The next award was "for the five cows in each breed competing which yielded the greatest net profit during the test." The Jerseys' average profit per cow was 6·46 dollars, and the best five shorthorns only averaged 5·15 dollars per cow; and they (the shorthorns) stood in the following order of merit amongst the seventy-five cows competing:—Fifth, tenth, thirteenth, twenty-fourth, and twenty-seventh. The next award was "for the five cows in any breed competing which yielded the greatest net profit during the test," and was awarded as follows: First, second, third, and fourth, Jerseys; fifth, shorthorn. It will be seen that, with the exception of the fifth cow, every one of the five winners was a Jersey, and the shorthorn is placed among the winners from the fact that the value of her increase in live weight was 2·52 dollars, otherwise she would have stood very much lower. The last award, the most important of all in the fifteen days' test, was "for the breed which yielded the greatest net profit during the test," and again the Jerseys were declared the victors. A more sweeping or more decisive victory for the Jersey breed could hardly have been looked for, as they won at every point in the test with a large margin to spare. They gave the most milk containing the greatest percentage of fat and solids, and consequently the greatest amount of cheese. They also gave a net profit per cow over the other breeds which would of itself constitute a fair profit to ordinary dairymen. Undoubtedly the most interesting test of all was the ninety-day, as showing the staying qualities of the cows and the breeds, and, if the Jerseys won easily the fifteen-day test, they fairly romped over the other breeds in the ninety-day test. The average length of time each Jersey cow had been in milk at the end of the test was 154 days. The total quantity of milk given by the Jerseys exceeded that of the shorthorns by 7,225 lb. The butter given by the Jerseys in the ninety days was 4,274 lb., being an average for the twenty-five cows of nearly 2 lb. per cow per day.

The total quantity of butter produced by the Jerseys exceeded that given by the Guernseys by 913 lb. and the shorthorns by 1,383 lb. The milk required to make 1 lb. of butter was—Jerseys, 17·2 lb.; Guernseys, 18·4 lb.; shorthorns, 22·9 lb. The cost of feed per lb. of butter was as follows:—Jerseys, \$0·13·75; Guernseys, \$0·14·41; shorthorns, \$0·17·36. Analysing the results per individual cow, the highest net profit per day for any shorthorn cow was 58 cents, which was exceeded by twelve Jerseys. The highest net profit per day for any cow was 81 cents, made by the Jersey cow, Brown Bessie. The above figures tell their own story, and in most unmistakable terms the Jersey has proved herself, in this greatest of all tests, infinitely superior to all other cows. Dairymen do not want to feed animals that carry more weight than is necessary for dairy purposes. Therefore those breeds that are inclined to turn the bulk of their food into flesh instead of butter-fat are not the most profitable dairy animals. The breed for the dairy is undoubtedly the one that will stand heavy feeding without fattening, and will, with increase of feed, increase its yield. In this respect the Jersey stands head and shoulders over all other breeds. She gives the most generous returns for the amounts of food consumed, and, where butter or cheese is required instead of beef, the more Jersey strain in the herd the better. There is just the danger, here, in purchasing a Jersey bull, of not getting the genuine article. The Jerseys so completely stamp the colour of their offspring that it is often impossible to distinguish the grade from the purebred, and dairymen should seek the assistance of their herd-book society in determining on a bull for stud purposes.

In Jersey no animal is entitled to registration until the judges satisfy themselves about its dairy qualities. Good management is as necessary as a good breed of cattle in successful dairying, and more failures in dairying are attributable to bad management than to bad cattle. The ways of the kingdom of cowdom are little understood by the average dairyman, and my advice to dairymen wishing to possess good herds is not to purchase a large number of pure cows: rather let them commence with the cows they have and a bull of high lineage, and use him for grading up their present herds. They will find

the improvement to be quite as fast as they will learn how to manage them. When dairymen say that they find the Jersey does not do well in their district, they simply accuse themselves of bad management. The Jersey has definitely established its capacity to do well in every country, and to endure all climates and conditions, from the coldest climates to the very tropics. Under any circumstances the Jersey cows are able to hold their own with any of their competitors. They accommodate themselves to climatic conditions with as much readiness as man himself, but, like man, they want proper shelter, care, and proper feed.

DEHORNING CATTLE.

There are many kind-hearted people who look upon the dehorning of cattle as a most cruel performance. But have they had any experience in the operation? We grant that dehorning, as was practised on a station in the Gulf country, was atrocious cruelty. There, the blacks employed on the station dehorned the beasts by simply smashing off the horns with long waddies. But there are methods of dehorning which are either absolutely painless, so far as young steers and heifers are concerned, or of even less painful nature, in the case of milking cows, than the extraction of a tooth from a human being.

It is absolute kindness to dehorn young cattle. It may be done, as we have often described, by the application of caustic potash to the embryo horn of the calf of two or three months old. The only danger is that the operator may not exercise sufficient care to prevent the liquid running into the eyes of the animal and causing thus intense pain and loss of eyesight. As far as the destruction of the horn is concerned, there is practically little pain. A better method comes to us from the *Florida Agriculturist*:—That is with a branding iron. This is the method:—Screw a three-quarter nut on to the end of an iron rod, heat it red hot and press it only for an instant, with a firm sure hand—holding the calf securely—on the little cone or embryo horn, and the work is done. This is for very young animals. When the calf is from two to four months old, file sharp a pair of blacksmith's pinchers, and with one snip the little button can be clipped off clean from the surface. Apply grease and tar in either case, renew it perhaps once or twice, and the operation is done. In the case of very young calves, the little fellows will be playing around in 5 minutes, apparently unconscious of the operation. Experienced Florida stockmen, however, contend that it is better to defer the operation of dehorning until the animal is two or three years old. If the animal is dehorned when very young and grows up a "muley," it learns to butt to some extent, and is more inclined to break fences and creep through into inclosures. If dehorned when nearly grown, the operation cows it completely, the unruly disposition is subdued, there is no more fighting or hectoring of its fellows. The idea that cows shrink in their milk yield is wholly erroneous. They may drop off slightly for two or three days, but they soon recover. The yield is increased, if anything, for the dehorned animal is quiet, docile, and spends more time in grazing and less in lording it over his fellows.

A REVOLUTION IN CHEESE-MAKING.

It has hitherto been believed that certain bacteria are largely responsible for the proper curing of cheese. This theory would appear to be exploded if it be correct, as was lately announced by Superintendent Henry, of the United States Experiment Station, that Professors Russell and Babcock had made a discovery which would effect a revolution in cheese-making. That discovery is, that bacteria have no part in successful cheese-curing, but that it is due to the secretion by the cow, with the milk, of a fluid called galactose. This is what cures the cheese, and which also admits of cheese being cured better at low

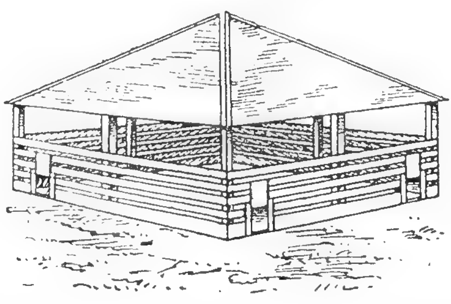
temperatures than at the medium temperatures which all cheese-makers have believed to be necessary, for the reason that the bacteria believed to be the agents in the curing could not live in a low temperature. The professors declare that those bacteria are unnecessary—indeed, that they are injurious, and, by being destroyed by the low temperature, allow the galactose to do its work better.

FEEDING BROOD SOWS.

Most pig-breeders do not allow the breeding sow to become very fat, under the impression that they will not breed well. Be that as it may, it is certain that, if fine vigorous, early maturing stock is desired, the sow should be fed liberally even after it is a year old. A good fat sow will throw stronger and better pigs, and suckle them much better than a thin one. It is also not probable that she will have less pigs at a litter than a thin one. Certainly her litter will be worth more money. And the same may be said of the boar; keep him in good condition, and he will get better pigs than if he is allowed to run down in flesh. The litter from a fat boar and sow will fetch far more money than those produced if they are allowed to get thin. Therefore, it pays to feed the breeding animals liberally; they will not get too fat to throw vigorous healthy progeny.

A YOUNG PIG PROTECTOR.

Young pigs that have got away from the nourishing care of the parent sow are often left to shift for themselves. It is then that their trials and tribulations commence, for when the feeding time comes and pigs, big and little, have to fight for place and priority, the survival of the fittest becomes the order of things. To obviate this, and render it possible for the young and weaklings to thrive, it is well to build a pen, say, 16 feet square, or more if the number of pigs should require it, in which a good floor should be laid, on which troughs are placed to hold slop or other provender. Then cut holes with a slide, the opening of which can be regulated to suit the size of the hogs to be admitted to



the pen. This will enable the young ones to get in and eat without the risk of being knocked about by the larger animals. The little pigs should be fed first in order to draw them into the pen, and while they are busy satisfying themselves there the big hogs outside can be served with their share of feed. If it is not convenient to put a floor in the pen, the pen can be made portable, and then moved from point to point as the pound gets muddy. The following instructions for making the pen may serve:—The posts should be 7 feet high, and roofed with good material if permanence is desired; 16 feet square should be the size, and for siding-up 6 inches fencing will answer. Cedar or oak will make suitable posts.

HOW TO CURE PORK.

W. F. Harvard writes to *Farm and Ranch:*—I have always been so successful in my curing that I have never lost any pork since I began the plan thirty years ago. At the time I learned it I lived in Florida, where it is very difficult some winters to save meat. The plan is this: Just as you get the hogs dressed proceed at once while the meat is warm, and cut it up and salt it down in a box or something, using plenty of salt. Try to get it salted while the animal heat is in the meat, and let it stay in a bulk twenty-four hours and then take it out and spread it all night. Early next morning pack away, covering it with salt, and it will keep. I don't care what change comes in the weather. Remember now, if you kill the hogs to-day, salt as directed and let it be in salt until the next night, which will be about twenty-four hours. If the weather is very cold it won't hurt to lie thirty-six hours. The explanation is this: The animal heat in the meat acts as a conducter of the salt. It will strike through the meat in twenty-four or thirty-six hours while it is warm, but it is hard to get the salt to strike after the meat is cold. Let it stay in salt about sixteen days and take it out on a cool day, dip it in hot water and hang up. If you follow this plan you will never have any spoiled meat. When the time comes to spread it, do so, regardless of the weather.

ANGORA GOATS.

The fleece of an Angora goat weighs from 3 lb. to 5 lb., varying according to quality, and the quality varying with the purity of the breed. (The fleece of the buck weighs from 6 lb. to 9 lb.) Half-breds scarcely pay for shearing, while the fleece of the nearly pure Angora ranges in value from 1s. 3d. to 1s. 8d. per lb.

Say the average fleece weighs 4 lb., at an average price of 1s. 6d., each fleece then produces 6s., then on 300 acres sufficient goats may be reared to yield a gross income of £900 per annum. Shearing at £1 per score would amount to £150, and this with baling and freight would be the principal item of expenditure. Very little expenditure need be incurred for forage, because the animals in good, scrubby country, well stocked with shrubs and grass of different kinds, easily pick up their own living in the bush. Besides the mohair, the skins are valuable, and there is always surplus stock for sale.

The owner of 160 acres could, however, make a very good addition to his income by keeping merely 50 Angoras, allowing them plenty of run. The mohair from these would be worth £20 per annum, besides which the increase could be sold, and as time goes on the old goats could be replaced by young stock, and the skins of the former at 1s. 8d. per lb. would add to the income from the flock. A skin weighs from 4 lb. to 5 lb. On most hill-farms of any extent there is to be found a proportion of stony or scrubby country useless for grazing either sheep or cattle, but on which goats would thrive and look after themselves, hence it would be to the advantage of anyone owning such land to start a small flock of these valuable animals.

THE MOHAIR INDUSTRY.

The breeding of the Angora for the production of mohair is, perhaps, just as great a study as is the merino sheep and its fleece. The same peculiar qualifications are the requisite accompaniments to success, but the usual drudgery of management is claimed by the Cape farmer to be less with the Angora than with sheep, and thus the goats are often used as leaders for the convenience of working flocks of the latter. One of the most important proofs of purity and quality in the Angora is the character or curliness of the hair, and all young stock that do not possess this to a marked degree should be rejected from the stud flock. Evenness and fineness of quality, length of staple, and evenness

and extent of character, together with density, and a bright and lustrous silky fleece, free from kemp, a long straight hair permeating the fleece, are the characteristics constituting a standard of excellence equally as high as many of our ablest men have spent lifetimes in striving to attain in the breeding of the merino. The horns of the Angora, as with the merino ram, may be said to be indicative of the quality and character of the fleece, while with the does a fine and delicately-curved horn is most preferred. Of the Cape Angora, it is said by Schreiner that it is a distant cross with the Kurd, or common goat; that the breed is not quite fixed, but is gradually tending to become so; is a larger, somewhat coarser, harder breed, with an oilier and heavier fleece, though not attaining to the high standard of the pure Angora; yet, nevertheless, in the best specimens of great beauty and excellence, and equal to the most exacting demands of the present mohair manufacturing trade.

As an instance o the progress made in the establishment of the industry in South Africa it may be mentioned that the first regular export commenced in 1857, and was valued at £10. In following the figures of 1897 we find the total value exported for that year is £676,644. This, of course, represents all grades, and comparatively little of the product of the pure blood. The thick Boer goat-like form and head is a peculiar characteristic of the great majority of even the finest specimens of the South African Angora, and it is now only reasonable to suppose that this distinguishing mark of the cross will always remain. No matter how much superior an animal of this description may be in all other respects, it must always be wiser to revert to the original pure-bred animal as a sire, particularly for the purpose of cross-breeding. It is to be noticed that while the general average of the Cape Angora is considerably lower than, say, for example, that of Mr. Scammell's flock in South Australia, the individual fleeces of choice specimens are much higher than any yet attained in Australia. In judging the respective merits of the two, however, we must bear in mind that the fleece of our Australian animal is particularly void of grease, while still being silky, soft, and lustrous, and full of character. The Cape goat is often almost black with grease, straighter and coarser in fibre, less lustrous, and would probably scour to a smaller value. Certain it seems that the carefully-bred original and pure Angora, such as those constituting Mr. Scammell's flock, must always command a higher ideal in the minds of all connected with the mohair industry than would the choicest animals of other origin.

In the United States in 1897 there were estimated to be 247,775 Angoras, which were not, of course, all first-class animals, a large number being of low grade. The American supply of mohair is far less than the local demand, and being a large manufacturer, the States import from England no less than 1,250,000 lb. annually, and the industry is still rapidly increasing. It is said that there were only about 400 Angoras originally imported, and those at about the same date as they were introduced into South Africa. Considering the large extent of the States that must have been found unsuitable, also the many other profitable and varying industries with which the Angora has had to compete, the progress has certainly not been disparaging.

MOHAIR—ITS SUPPLY AND DEMAND.

The United States Agricultural Department reported some years since, which has been fully borne out, that the demand for mohair is permanent and increasing, and would continue to increase until met by vastly more copious production beyond the possible increased Asiatic supplies. The manufacturers in England, the Continent, and America were looking to South Africa, Australia, the States, and South America for an increased production to meet their necessities, and the value of the entire interest would be enormously enhanced by the opening of an adequate and permanent source of supply. In 1895 the world's reputed production of mohair from all sources was placed at about 20,000,000 lb., coming principally from Turkey, the Cape, and supplemented by about 5,000,000 lb. grown in the United States, and but small quantities from Australia.—*Pastoralists' Review.*

MILKING.

The *Agricultural Journal* of the Cape of Good Hope has the following very valuable paper on milking, which is a translation of a prize essay by Mr. J. Petersen, of Dalum Agricultural College, Odense, Denmark, who was adjudged a prize-winner :—

INTRODUCTORY.

The udder is, from the point of view of the milker, the cow's most important part.

That a proper use develops the living instrument is a maxim which applies to the udder of a cow as well as to a multitude of other things.

That use develops the instrument is easily shown by example. A workman knows that unusual labour causes a strain at first. The sower feels tired in his right arm, the harvester tired in the back, the milker tired in his arms and hands, &c., but before long they accomplish the one-sided work without feeling much strain or tiredness.

Only the use which causes considerable exertion brings on further development. The way to exert the udder is to milk it completely dry. The milker should imitate the greedy calf, which sucks the last drop of milk out of the teat. This causes a greater flow of milk to the glands of the udder, and it is from the blood that all material for further development and for the forming of more milk must be sought.

It is in the above facts that one finds an explanation of the case (so common in Denmark) of the agricultural labourer's wife getting quite a lot of milk from her cow, which on a large farm would be found useless for the dairy. Whoever undertakes milking should certainly know the above facts.

HOW TO MILK.

The object of milking is to empty as completely as possible all the milk present in the udder, and in such a way that the cow finds it a pleasant sensation, and that the milk is kept clean. The cow is by nature meant to nourish its young. We ought, therefore, to learn from the calf. The latter does not suck its mother in a brutal manner. On the contrary, it knows by instinct that if it wants milk it must behave properly; therefore, it never grabs a teat at once, but asks, by touching the belly and the udder, if it may. The milker ought to begin by speaking kindly to the cow, patting it, and afterwards with the back of the hand rubbing it gently on the belly and udder. By this means one not only puts the cow into a good temper, but the rubbing helps to get rid of loose hairs, scales, and dust, &c., which otherwise easily find their way into the milk pail.

Next, the milk pail is placed under the udder (always on the same side of the cow), and the work is begun by catching hold round both the front teats with the whole hands. The hands are now in turn moved up against the udder with a gentle pressure, and they are then closed slowly and softly (likewise in turn) about the teat, the closing beginning at the top and extending downwards.

These gentle movements should be continued until one notices the cow lets the milk "come."

The milk must now be emptied out in long unbroken jets by means of the same movements of the hands as before, but applied with more vigour than at the beginning. For every fresh grip the hand ought to exert a new pressure up against the udder, while at the same moment the first finger and thumb should grasp that portion of the udder which lies exactly above the teat. During this part of the milking the conscientious milker ought to fix the whole of his attention on his work, since *every interruption means a loss of milk*. Hence all loud talk or noise, which disturbs the cow as well as the man, is to be strictly avoided. A good enlivening song need not, however, be out of place.

When the front teats give no more milk the work is carried on—without the preliminaries of patting, rubbing, and so on—in the same way as regards the back teats.

The milk must be *squeezed*—not dragged—out of the teat. The teat should therefore be grasped with the whole hand, and the latter must not slide up and down the teat more than necessary. The sort of milking which is carried out by grasping the top of the teat with the thumb and first finger or thumb and second finger (the latter is the worse), and then pressing the fingers together and dragging them down the teat, is very bad indeed. The cow does not like it, since it irritates the skin on the teat, and easily causes sores, and it is really much harder work for the milker.

In the case of those heifers, however, whose teats are too short for the whole hand to grasp them, the fingers must, of course, be used.

The milking is not over even when the back teats (or the last milked) give no more milk. *A vigorous second milking must now take place.* After one has again changed a few times from the first milked to the last milked teat and back again, the udder must be thoroughly "worked" by means of gentle handling, and afterwards the last drops of milk must be squeezed out of the teats.

Here we could also learn from Nature. Look at the lamb, when it sucks! See how it pushes its mother's udder when the teat gives too little milk.

The little pig also can be seen poking its mother by means of its soft snout, so as to get all the milk possible.

One would almost think that they found the last milk sweeter than the first! So they no doubt do, as it has been proved by a number of investigations that it is by far the richest.

If the first half pounds of milk are mixed (equal amounts being taken from the four teats) from each of, say, forty cows, the 20 lb. of milk thus collected will, as a rule, not even produce ½ lb. of butter.

But if in the same way one were to collect the last half pounds, which after inadequate milking can still be worked out of the udders of the same forty cows, nearly 2 lb. of butter can be got out of the 20 lb. of milk.

Any milker can roughly prove this for himself. Collect the first jet from a teat in a small glass, and the last jet (or the last drops) which can be squeezed out of the same teat in another glass. Place the two small glasses in a cool place ; and after twenty-four hours it is astonishing to see the great difference there is in the layer of cream. The first milk is only good skimmed milk, while the last is nearly thin cream. Getting out all the possible milk is, therefore, of importance not only for the development of the cow's power of giving milk, but also for obtaining rich milk. Thus the milker who does not take sufficient time to milk the cow quite dry either does not know her or his work or is not carrying it out conscientiously.

After the milking is finished the cow should again be patted in a soothing way, and a kind word may again be said to her.

The milker should always keep an eye on the state of health of the udder and teats. If swellings or lumps or tenderness in the udder, sores on the teats, or blocked milk channels are observed, or the milk looks unnatural (for example, lumpy, reddish, &c.), the owner or other responsible person should be at once informed.

As diseases of the udder and teats are often infectious, such cows should always be milked last, and the milk from the diseased udder should be carefully put in a separate pail and thoroughly disinfected (and then thrown away, of course) or thrown away where it cannot spread the infection.

The milk canal inside the teat is occasionally very narrow or has a frequent tendency to get blocked. To make use of a straw or such means to clear it is very wrong, as it can set up inflammation in the corresponding gland. A teat with a blocked milk canal should be rolled gently between the hands held out flat and then carefully milked.

After the first calf the heifer is apt to feel tender, and hence inclined to object to the milker's touch. This tenderness lasts, in a few cases, to the later years. In such cases one must set about milking with even greater gentleness and care. Nothing but kindness should be used unless the cow is very "wicked."

To milk quite dry, as a means of increasing the milk-giving power of a cow, is especially important in the case of a heifer after its first calf, since it acts with even greater power on the heifer than on the older cow.

It would be a good thing if every milker was provided with two smocks of washable material, one being always in the wash or clean, so that a clean one may be put on at least once a week. As one ought to milk with bare arms, these blouses should have short sleeves, and be made so that they can easily be slipped on over the ordinary dress.

In wet weather, when milking is done out of doors, a waterproof cloak is almost a necessity.

It should be a point of honour for the milker to see that all pails, &c., in which the milk is collected should be absolutely clean. This scrupulous cleanliness is, of course, a necessity. The pails, &c., are best made of tin-plated steel, and must not be allowed to rust.

Complete cleaning is best and most easily done as follows:—Immediately they are finished with, the pails are washed with two or three lots of cold water; afterwards they are completely covered both inside and outside with thick lime water, then scrubbed with cold water, rinsed and washed again two or three times in clean cold water and finally in clean boiling water, and then allowed to drain dry in the open air; they must not be wiped with a cloth nor with anything else. Be it morning, noon, or evening, the hands must be carefully washed before going to milking, and if the milking is done indoors one should also wash and dry the hands whenever they get at all dirty.

For the sake of cleanliness it is best to milk with dry hands.

Whoever has the care of cows, it should be their object to keep them clean. If the udder is in a filthy condition it must, before milking is begun, be washed clean with lukewarm water, and rubbed dry with a piece of cloth.

Milk has a great capacity for absorbing gases from the air, and, since it offers an extensive surface as it passes in jets through the air between the teat and the pail, the air in the shed should—especially during milking—be kept as pure as one can possibly keep it. For this reason, if the cows are indoors, they should be made to stand up a little while before milking begins. They will then probably get rid of their manure. Afterwards all available doors and windows should be opened for a few minutes; the litter is arranged and things are put in order, so that everything is as it should be when the milking is to begin.

Light helps to keep the air pure, so one should always have plenty of daylight in the shed; and, if the cows are milked indoors in the dark winter mornings and evenings, plenty of lantern light gives a better chance of good and clean milking.

MILKING TIMES.

If a cow is milked three times in every twenty-four hours, the milk obtained is both more abundant and richer than if milking takes place only twice a day. But whether one milks three times or only twice daily, the times between the milkings should always be as nearly as possible of the same length.

The cow is a creature of habit; its udder works steadily and regularly. Hence the milking time should be most carefully kept, and the same pair of hands should milk the same cows in the same order. If milking is begun too late the cow becomes restless, and as regards those which gives much milk the tension in the udder can give pain—in all cases milk is lost. Altogether it ought to be clearly realised that the cow repays all unpleasantness by giving less milk.

GOOD ADVICE (In Brief).

1. *The cow is a living creature.*
   a Use her kindly and you get more milk from her.

2. *Use develops the living instrument.*
   a. Milk dry! Milking dry develops the udder and consequently the power of giving milk.
   b. And one obtains richer milk, *since the very last milk is by far the richest.*

3. *Milk in the right manner.*
   a. Grasp the teat with the whole hand.
   b. *Press* the milk out.
   c. Don't forget the gentle push up against the udder.
   d. Never stop nor let the work be interrupted when milk is "coming."
   e. Remember the second milking and the last drops.
   f. Pat the cow when you have finished milking.

4. *Cleanly milking.*
   a. Have clean pails (to milk into and for carrying the milk).
   b. Wash your hands before and (in the shed) during milking.
   c. It is best to milk with dry hands.
   d. Milk in a suitable and clean smock.

5. *The state of health of the udder.*
   a. Tenderness or hard lumps in the udder or on the teats.
   b. Blocked milk channel, &c., or
   c. Unnatural looking milk—should all be *at once* reported to the owner or other responsible person.

6. Milking Times.
   a. Begin at a fixed time.
   b. Milk the same cows in the same order.

To whoever has charge of the cows:—

1. Clean cows.
2. Good air in the shed.
3. Plenty of light.

MACHINE FOR TOPPING BEETS.

A machine for topping beets has been invented by Julius H. Luhrs, of Fruita, Colorado, U.S.A. It is so constructed that the cutters will remove the same amount of crowns from the beets, whether the crowns be just above the surface of the ground or extend some distance above it. The machine is light and strong, and is provided with means whereby the cutting section will automatically adjust itself to the exposed portions of the beets in its path so that the crowns will be cut at a uniform depth.

The invention of such a machine as above described would appear to point to the invention of a cane-topping machine. The difficulty with a cane-topper has always been the unequal length of the canes. If, however, the automatic adjustment of the cutter in the case of beets can be applied to sugar-cane, the problem of cane-topping and cutting by machinery will probably be solved.

Poultry.

DO POULTRY PAY?

By JAMES TROW, Rocklea.

This is a question often asked. After fourteen years' practical experience I can assert that it pays anyone to keep poultry on a small scale for eggs alone, but a good many who keep fowls for profit give them up after a little time, for the simple reason that they jump to conclusions and purchase a few fowls of any age and of any kind, dump them down in their backyard or poultry run, and then expect them to do all the rest. It is not absolutely necessary to get pure stock to start with: a few crossbreds (first crosses) of Minorcas, Hamburgs, Leghorns, Wyandottes, or Andalusians are about the best crosses for egg production. One hears a good deal about one breed being better than another as winter layers. Feed your fowls properly and they all will lay nearly as well in winter as in summer. But some say: How is it that eggs are dearer in winter? The reason is, that the fowls are fed principally on maize all the year round. In the spring and summer they pick up a good deal of animal food, such as worms and grubs, and also green food, all of which go to make a variety. In winter there is little for them to pick up, therefore the want must be supplied with something as nearly allied as possible to the summer food, and that something is a little cooked meat. I have found a little raw meat, about two or three times per week, to be a very good thing for the birds, but some feed raw meat at all times with no bad results. It may be objected that meat is too dear to feed fowls upon; true, if you buy prime joints, but you can always purchase liver cheap enough. My plan of feeding my fowls has been for years to give crushed wheat in which I put a little salt. I scald the wheat on previous night and make it into a stiff dough with pollard and bonemeal for the morning meal, with whole wheat at night. In the winter months I add a few chillies when scalding the crushed wheat, and feed in the morning in the same way as in summer, giving a little meat and green feed during the day, whole maize occasionally, and sometimes whole wheat. If the weather is mild I always manage to keep up a good supply of eggs all the year round, and also have plenty of broody hens to sit during the winter. Some think eggs at 1s. 6d. per dozen are too dear to set. This is a mistake, for the resulting young cockerels will be in their prime at Christmas and some of the pullets will be laying when eggs are bringing a good price. The chicks hatched in June especially are more vigorous, and you miss the thousand-and-one ills which summer and late-hatched chicks are subject to, as they are nearly full grown before these diseases appear. Consequently, what you think you lose in one way you gain by 50 per cent. in the other. I have set hens all the year round, and find that chicks hatched between the months of April and August, but not later than September, turn out well; but the best results are from those hatched between May and July. At present I have several broods looking the picture of health, also several hens sitting. I find it just as easy to rear chicks during the winter months, adopting the most primitive methods (beer cases with wire-netting), as I do at any other time. I condemn summer hatching as productive of all diseases incidental to poultry. After three years' experiments with forty hens, I can give what I think will be conclusive proof to our farmers that a few hens well looked after will pay well, but large numbers will not pay so well *pro ratâ*, and it is here where beginners make a mistake, as I will try to show. My returns for three years from 1898 were three eggs per week per hen, total for the year 6,240, for which I got 8d. per dozen all round from 1st May, 1898, to 1st May, 1899.

The cash return for eggs was £19 10s. The cost of feed was £10 0s. 6d., and the profit was £9 9s. 6d. 1st May, 1899, to 1900, received for eggs, £23 11s. 7d.; twenty old hens, £1; total, £24 11s. 9d. Feed, £12 10s. 6d.; profit, £11 1s. 1d. From 1st May, 1900, to 1901, the eggs brought £26; forty old hens and fifteen pair of cockerels, £4 5s. Cost of feed, £16 17s.; profit, £13 8s. During June, 1900, my forty hens laid 406 eggs; in July, 461 eggs, so that a net profit of £13 8s. on the first outlay of forty hens at 1s. 6d. each—viz., £3—is not a bad investment; but unless you look after them and do not overcrowd them, you will fail to make a profit. I intend to extend my flock to about sixty and then draw the line, for during the years 1886 and 1887 I kept over 200, when the largest balance I had was £23 2s. 9d., and some of the birds I sold at over £2 10s. per pair; so I would advise anyone to start with a few, to look after them well, and, when he thoroughly understands the business, to increase their numbers.

SICK CHICKENS.

American poultry-breeders do not appear to consider it worth while to waste time over sick chickens. The *Weekly Call*, Cal., says:—The best way to treat a sick chicken is to kill and bury it. If it is grown, cut off its head, selecting a place for the operation where the healthly birds will not get at the blood. Bury the bird near a grape vine, if you grow grapes. If it is a deformed or sickly chick, do not bother with it, but kill and bury it near a potato plant. It will give more profit there than it will in any other way. In most sicknesses the fowl is neglected until it has spread the disease. The attempt to doctor it, if made at all, should be made as soon as the bird begins to mope. Cholera, the worst disease we have to contend with, is spread through the droppings. A cholera-infected bird may be kept in the next pen to the healthy stock, with only a wire-netting to separate them, and will not spread the disease among the flock.

But the trouble often is, the sick bird is not separated from the flock soon enough. A poultry-raiser of our acquaintance is very successful, and he rightly enforces the rule to kill every bird that shows signs of sickness. He says that others may spend their time doctoring hens if they wish to, but he has no time to do it, and does not care to run the risk of having sick fowls about.

He boasts of raising ninety chickens out of 100. In a loft in his hen-house he keeps a salamander stove, which he can readily heat up, and in that stove he burns every sick fowl that he kills. As intimated above, we think a dead fowl can be put to better use than that, and not endanger the flock within. On a smaller scale I have tried the killing remedy, and it has worked well. Do the best we may, and we shall lose chickens, and have some sick fowls. However, cleanliness, extermination of lice, careful feeding, and care not to over-crowd, will reduce sickness to the minimum. Much of the trouble that comes to the young flock is the result of weak stock, and a weak, sickly chick is better dead than alive. It is folly to breed from a weak stock if we know it, but having done it, weeding out the flock is advisable, and a necessity. Save the strong chicks and destroy the weak ones. Weed out as heroically as you weed out a herd of cattle or sheep.

EGG-EATING.

Strictly speaking, this is not a disease, but a bad habit the fowls acquire, and when fowls or any other member of the farmyard develop a bad habit, a cure is not easy. A crib-biting horse is a nuisance, and so is an egg-eating hen, and when this vice gets into the poultry-yard the loss of eggs and temper by the owner is usually severe. There is, of course, a humorous side to the hens

disposing of their own property in their own way, though the owner of the egg-eating hens finds it difficult of discovery. As prevention is not only better, but far easier, than a cure, let us first consider how to prevent our fowls "commandeering" the contents of the nest-boxes, and this is really quite easy. It is not natural for a fowl to eat her eggs as she lays them, and under proper conditions the desire to do so never develops. It is fowls that are neglected that most usually turn egg-eaters, and fowls in strict confinement with nothing to do; or a shell-less egg is laid, the thin envelope that holds the contents breaks, and the fowls, digging their beaks into the stuff, find it palatable. Some poultry-keepers make it a rule to leave sham eggs lying about in a pen where pullets are kept; I have always done it, and the reason is that a young fowl pecks at everything she sees, and speedily learns that eggs are uneatable apparently. A pullet often drops her first egg on the ground, then she inspects it curiously, and if she has never seen an egg, real or sham, before, pecks at it. The shell may defy the pullet's beak, and then no harm is done, but if it breaks the young fowl eats the egg and develops a taste for them. But when the pullet has seen eggs lying about in the yard before, she usually ignores her own. Sometimes fowls get fighting in a favourite nest-box, and then an egg gets broken; sometimes the nests are so scantily supplied with straw or any nest material that the risk of breakage is greatly enhanced; an accidental breakage is in the majority of cases the cause of the habit developing. By giving plenty of roomy nest-boxes, with ample nest material, by regular collection of the eggs, by giving grit and pounded oyster-shell, so that the formation of shell-less eggs is unlikely to occur, and by leaving china eggs about where pullets are, the danger of egg-eating ever beginning is very greatly reduced. So much for prevention.

Infallible cures there are none, beyond wringing the culprit's neck, and if a hen is caught eating an egg—a hen in a pen of fowls that have not begun imitating her—I strongly recommend this drastic treatment. Once egg-eating has begun, it is very hard to detect the culprit or culprits, as they clean the stains of yolk off their beaks very carefully, but if the birds are all handled, and the combs and wattles minutely examined, stains of dried yolk adhering thereon will be detected. The best remedy now is to cut the fowls' beaks with a moderately sharp penknife. Take the fowl between the knees, and, holding the head with the left hand, turn away the horn of the beak and snip off the tip just as though trimming a finger-nail. This must be done very gently, so as not to cut the quick, as if this is done blood is drawn and the fowl suffers pain. Done with care, this operation is quite painless, and the fowl left with a beak capable of picking up grains and eating soft food, but not capable of breaking the hard shell of an egg. In a short time the horn grows again, but most probably the fowl has by then forgotten her evil habit, but if she breaks out a second time a cure is impossible, and she had better be killed.

This plan is far more efficacious than the common one of giving the fowls rotten eggs to eat and preparing shells filled with mustard and pepper. It is well to remember that as often as not the culprit is the cock; as a rule, there is only one egg-breaker in the pen, the others merely assisting in the eating, and this is why the removal of the real culprit often checks the habit.

TO TELL THE AGE OF EGGS.

Make a brine by adding 2 oz. of salt to 1 pint of water. Place your doubtful eggs one by one into the solution. If the egg is old, it will float on the surface; if fresh laid, it will sink to the bottom; if one day old, it will sink but not touch bottom; if three days old, it will float just below the surface. The reason for this is simple enough. As the egg ages, it loses moisture by evaporation, and, consequently, the older the egg the lighter it becomes.

INDIAN RUNNER DUCKS.

By HERBERT SIMPSON, Junr.

Appended will be found a few facts, some of which, though they may have appeared once, will be new to a great many readers of this *Journal*:—

This variety of ducks originated, as its name implies, in India, some specimens being brought over to England by a sea captain about sixty years ago, which were presented to a friend in Cumberland, and from those the present strain has been bred. English fanciers have made several attempts to procure fresh blood from their original home, but so far without success. They seem to be extinct in India. In weight they are about the same as the common grey duck, but stand a great deal taller, owing to their long necks and upright carriage of body. The legs seem to be set very far back, even more so than the Pekin. The bill is free from the dished shape of that of the common duck, being almost a straight line from point to skull. The eyes are set very high up, almost level with top of skull. I am not aware of any standard colour being fixed for this breed, but, as years go on, fixed colours will no doubt be recognised. At present I find from the best stock obtainable, they breed very irregularly as to colour, more especially the ducks, some showing more white than others. Drakes seem to come truer, but all show a distinct white ring around neck, which, to my mind, sets them off. Several have written to me and asked if Indian Runners are really better layers than the breeds we now have—viz., Pekins, Aylesburys, Rouens, &c. To all such I have answered that those breeds of ducks are simply "not in it" where egg production is the main consideration. Another thing in their favour is the fact that they can endure great heat; summer never seems to be too hot for them, for I often noticed last year that, while Pekins and Aylesburys were under shady places gasping for breath, the Runners were half-a-mile from home looking for food. Where a good swamp or paddock is at hand, they will almost keep themselves.

Those who are not near a swamp can obtain just as good results by giving food of the right kind. My breeding ducks, though penned up, are laying just as well as those with full range. I find the young ducks very easy to rear, and out of a number hatched this year have only lost two as yet.

I keep a daily record of all eggs laid, but, to save space, attached will be found a list showing the weekly laying of six Indian Runner ducks from the beginning of February to the end of July this year, which shows an average of 118 eggs per duck for six months, or 236 eggs per duck per year. It will also be noticed that hen eggs were almost unobtainable in these months:—

February.		March.		April.	
1 to 7 ...	... 15	1 to 7 ...	... 23	1 to 7 ...	... 22
8 to 14 ...	... 14	8 to 14 ...	... 20	8 to 14 ...	... 31
15 to 21 ...	... 17	15 to 21 ...	... 17	15 to 21 ...	... 33
22 to 28 ...	... 23	22 to 28 ...	... 19	22 to 28 ...	... 34
		29 to 31 ...	... 11	29 and 30	... 8
Total	... 69	Total	. 90	Total	... 128

May.		June.		July.	
1 to 7 ...	... 30	1 to 7 ...	... 36	1 to 7 ...	... 23
8 to 14 ...	... 35	8 to 14 ...	... 32	8 to 14 ...	... 29
15 to 21 ...	... 33	15 to 21 ...	... 29	15 to 21 ...	... 38
22 to 28 ...	... 35	22 to 28 ...	... 20	22 to 28 ...	... 37
29 to 31 ...	... 17	29 and 30	... 10	29 to 31 ...	... 17
Total	... 150	Total	... 127	Total	... 144

Total for six months, 708 eggs.

I shall also be pleased to supply a record as time goes on of the laying of these same six ducks for a further six months, making twelve months in all.

RAISING TURKEYS.

1. Never let the young turkeys get wet. The slightest dampness is fatal.

2. Feed nothing the first twenty-four hours after they are hatched.

3. Before putting them in the coop, see that it is perfectly clean and free from lice, and dust them three times a week with insect powder.

4. Be sure the hen is free from lice. Dust her, too.

5. Look out for mites and the large lice on the heads, necks, and vents. Grease heads, necks, and vents with lard, but avoid kerosene.

6. Nine-tenths of the young turkeys die from lice. Remember that.

7. Filth will soon make short work of them. Feed on clean surfaces. Give water in a manner so that they can only wet their beaks.

8. The first week feed a mixture of one egg (beaten) and sifted ground oats, mixed, with salt to taste, and cooked as bread; then crumble for them, with milk or curds, so that they can drink all they want. Feed every two hours early and late.

9. Give a little raw meat every day; also, finely chopped onions or other tender green food.

10. After the first week, keep wheat and ground bone in boxes before them all the time, but feed three times a day, on a mixture of cornmeal, wheat middlings, ground oats, all cooked, and to which chopped green food is added.

11. Mashed potatoes, cooked turnips, cold rice, and such will always be in order.

12. Too many hard-boiled eggs will cause bowel disease.

13. Remove coop to fresh ground often in order to avoid filth.

14. Ground bone, fine gravel, ground shells, and a dust bath must be provided.

15. Finely cut fresh bones from the butcher's, with the adhering meat, is excellent.

16. They must be carefully attended to until well feathered.

17. Give them liberty on dry, warm days.

18. A high roost, in an open shed, which faces the south (north in Queensland), is better than a closed house for grown turkeys.

19. A single union of a male and female fertilises all the eggs the hen will lay for the season; hence, one gobbler will suffice for twenty or more hens.

20. Two-year-old gobblers with pullets or a yearling gobbler with two-year-old hens is good mating. Gobblers and hens of the same age may be mated, but it is better to have a difference in the age.

21. Turkeys can be hatched in an incubator, and raised to the age of three months in a brooder, but only in lots of twenty-five, as they repuire constant care.

22. Capons make excellent nurses for turkeys and chicks.

23. It is not advisable to mate a 40-pound gobbler with common hens, as the result will be injury. A medium-sized gobbler is better.

24. Young gobblers may be distinguished from the females by being heavier, more masculine in appearance, more carunculated on the head, and by a development of the "tassels" on the breast. A little experience may be required at first.

25. Adult turkeys cannot be kept in confinement, as they will pine away. By feeding them in the barnyard a little, night and morning, they will not stray off very far, but they cannot be entirely prevented from roaming, and the hen prefers to make her own nest.—*Poultry Keeper.*

The Orchard.

A TOOL USEFUL IN THE CULTIVATION OF BANANAS.

The digging out of banana stems either for plants or to get rid of the old root which has produced stem and fruit is rather heavy work to a novice. There is an implement in use in some of the States of Central America called a *baraton.* The meaning of the word is a long lever, but the Spanish word for a lever is *palanca.* The correspondent of the Jamaica *Journal of Agriculture,* whence we derive our information, says that the word is found in only one Spanish dictionary. However that may be, it is claimed by cultivators of the banana in Central America that by the use of this implement stronger plants can be grown, which are more firmly rooted and fixed in the soil, and are thereby better able to resist the force of strong winds. The plants so treated are also held to be more vigorous and to produce superior bunches of fruit.

In shape and appearance the tool resembles somewhat a long-handled spade, but the blade instead of being flat, as in the spade, is made in the form of a vertical section of a cylinder, being curved or hollowed laterally. Its form thus adapts it to the circular contour of the stem, and it is forced into the soil pretty close to the decaying stem, and the adjacent earth is loosened by moving the long handle as a lever. It is then withdrawn and applied to the stem in a similar manner on the opposite side. Finally, the mass of dead and decaying stem is removed by using the implement in front as if it were a spade. The soil is then filled in.

The steel part of the implement is about 5½ inches wide; its height or depth is about 19 inches, and the handle is very long, in order to be used as a lever. The tool is sold by Messrs. Collins, of New York, and is numbered in their catalogue No. 404.

WEST INDIAN PRODUCE IN BIRMINGHAM.

Although shipments of soft fruits from Australia to England have often proved failures, still the time is not far distant when, owing to quicker means of transit, more careful selection and packing, and a better knowledge of the requirements of the home markets, the fruitgrowers of this State will be enabled to open up a profitable trade in such fruits as pineapples, bananas, oranges, lemons, and perhaps passion-fruit and Cape gooseberries.

Mangoes will also eventually find their way to the London market.

We in Australia are too prone to look to the Government to do all that is necessary to establish a new trade, but it must be clear that the Government with all its goodwill cannot command a payable market. That lies with the producers. The Department of Agriculture is always ready to help those who help themselves; but, as in the case of Jupiter and the wagoner, it says: "Put your own shoulder to the wheel, and then you may depend on my help."

In the case of West Indian produce, the Government has made arrangements for the encouragement of the fruit trade, and part of the fruit consignments under those arrangements reached the Birmingham market on the 21st March last in the shape of 800 bunches of bananas.

The *Birmingham Post* writes on this subject:—

The pineapples and oranges, so far, have gone to other markets, principally in London; but this part of the cargo, it is expected, will be represented in Birmingham. As far as the bananas are concerned, the experiment has not proved entirely satisfactory. The bananas have come from Jamaica

without any packing, while those from the Canary Islands are always carefully packed in crates, with wrappings of cotton wool. As bananas require to be kept at an even and fairly high temperature until they are ripe, Elder, Dempster, and Co., who have undertaken the shipment, issued the following notice to the leading merchants in the London and provincial markets a day or two ago:—"In view of the importation of Jamaica bananas into England without any packing being a new departure, and the fact that these bananas will eventually find their way into the hands of dealers who have never stocked this fruit before, we think it would be as well if you were to advise all your customers that the following instructions should be carefully attended to:—(1) Never allow the temperature in which they are kept to go below 60 degrees or above 75 degrees until the fruit is ripe; (2) keep the fruit out of any cold draught, which will always affect the colour when ripe; (3) in hanging up the bunches always hang them with the stem downwards, as the fingers will remain longer on the stem in this position. We hope shortly to send you some prettily illustrated pamphlets about the West Indian fruits generally, but meanwhile think you had better give all your customers the above instructions, which are essential to the successful ripening of bananas." The fruit on its arrival in this country was in good condition, but it seems to have sustained a good deal of damage from the way it has been dealt with after unshipment.

Lying loose on a railway truck on a bed of straw many of the unripe bunches were chilled, with the result that some of them will not ripen, while in many of the others a large proportion of the goods will bear black spots, which will reduce the retail value of the fruit and affect its keeping qualities on ripening. The best-kept banana has a clean-looking yellow pod with green ends. Owing to the want of crates, the handling of the bananas by smaller purchasers in the trade was rendered difficult, and the risk of further damage by cold was increased. Dealers in the immediate neighbourhood of the market who have facilities for storing the fruit in warm rooms may be able to make something out of the better-kept bunches, but generally speaking the trade has not fallen in love with the West India banana. They do not speak very highly of its quality, one leading merchant speaking of the taste of the Canary Island banana as compared with that of the Jamaica variety as being like a green pea compared with a grey pea. Some who have bought bunches of the West India fruit ripe, however, report that the flavour leaves little, if anything, to be desired. Bunches containing from 5 dozen to 12 dozen pods sold in the Birmingham market at from 2s. to 8s. each; while some of the finer lots purchased in small quantities for immediate sale went as high as 10s. There was a good demand until the disadvantages arising from the want of packing began to be realised. It is clear that either the West Indian exporters will have to take to packing the bananas or arrangements will have to be made for the packing them on unloading if they want to dispose of the fruit in this country to advantage. In the summer bananas might come safely without packing, but there is little or no demand for them then. If consignments continue to come in their present form, it seems likely that the greater part will go to the street hawkers rather than to the first-class shops.

The moral for Queensland fruitgrowers is the burden of Mr. Benson's song: Learn to grade, sweat, and pack, and success will eventually be achieved.

A MOVING SHEEP PEN.

Some interesting experiments have been carried on at the Michigan Agricultural College, Lansing, in grazing sheep in a moveable, bottomless pen. The sheep enclosed in it can only get at the grass or lucerne in front of them, and thus none is wasted by their trampling it down. The pen is rolled forward as the feed is eaten down. By this means it is claimed that over 1,000 lb. of meat can be produced on one acre of lucerne.

Horticulture.

ASPARAGUS.

This delicious vegetable may be planted from the present month to October. Up to a very late period it was considered that to grow asparagus successfully it was necessary to dig a deep pit and fill it full of manure, sowing the seed on the surface. This idea is now completely exploded. Such a bed is not at all necessary. If the bed be well dug or trenched and well manured, this is all that is necessary. If seed be sown, it will take three years to bring an asparagus bed into full production. The best plan is therefore to purchase plants, by which means two cropless years are saved. The plants should be quite fresh, and should be planted immediately, as they lose much initial vigour by being allowed to become dry.

THE PLANT.

The plant is very hardy as far as regards frost and sun, but it cannot withstand excessive moisture or stagnant soils. It prefers

SANDY SOIL AND PERFECT DRAINAGE.

It will also succeed well in chalk or calcareous soils. Deep, alluvial, sandy, soils, devoid of water-deposits below, it thrives in perfectly, if they are well worked up and liberally manured. It must always be borne in mind that the crop is a permanent one, which once properly planted will last for ten or twelve years. Therefore never plant asparagus on a damp, tenacious, water-logged soil.

FORMING BEDS.

Beds may be formed by hand or horse labour. With the latter the very deepest four-horse ploughing is necessary. None but the very best well-rotted manure should be used, and that very liberally. Let it be properly buried by placing it in the furrows with a fork. Before ploughing, however, it is well to spread a good quantity over the surface. The soil should lie closely together, therefore the land should be at once got into good order to be ready for the plants by September or October, and a month before planting. The plants should be grown in rows. The minimum distance between the rows should not be less than 3 feet.

SOWING SEEDS AND TRANSPLANTING.

There is something to be said in favour of both plans of establishing an asparagus bed. One or two year old plants give the quickest results, and, as already stated, obviate a cropless season or two, not to speak of the avoidance of the expense of keeping the ground clean for two or three years. Against these advantages it must be said that plants grown from seed are more vigorous, robust, endurable, and best cropping. When plants are dug up and broken, they lose some of their vigour and are rarely replaced in the new bed in the same position which they previously occupied in the old, and this is of greater importance than is thought. They have lost their primitive grip of the soil, and their future connection with it is an artificial one, and not at all beneficial to their well-being.

TIME FOR SOWING.

The best time to sow the seed or to transplant the crowns is between the middle of August and the first week in September, although planting may be continued until October. The frosts will then be no longer a source of danger to the tender plants. When raising from seed, it is as well to sow sufficient to ensure an even plant when thinning out. The customary depth to sow in seed beds is 1 inch, but under row culture, where there are not the same means of packing soil over the crowns, the seeds should be sown at not less than 2 inches

in depth, to ensure that the ultimate crowns are not too shallow. Where there is an opportunity of forcing asparagus, which is a very simple process, giving good returns, sow the seed in rows 2 feet apart; let the plants all grow until they are large enough for forcing, then dig up every other row for that purpose. This leaves the permanent plants 4 feet apart in the rows, under which conditions they will ultimately succeed remarkably well.

It should be noted that, by the methods we have described, the whole resource of the ground is not devoted to the asparagus crops alone, as good crops of lettuce, dwarf beans, &c., can be grown between the rows.

The richly-manured land will produce the best-hearted midsummer lettuce, however dry the season—from seeds sown in rows where they are to produce and carry the plants to perfection without transplanting. If Cos lettuce is sown in September, good lettuces will result, and this inter-cropping assists in keeping the ground free from weeds.

Thinning must be done when the asparagus plants are an inch or two high, provided the seedlings are strong. It will be well to sprinkle the seedlings with salt about twice a month, as it will benefit them and keep off injurious pests.

AFTER-CULTURE.

The whole after-culture of a bed of asparagus consists in placing a liberal row of fine decayed manure along the rows, exactly over the crowns, during September each year, or before the blades begin to push up.

METHODS OF TRANSPLANTING.

Two distinct plans are advocated. One is to chop out with a spade a slanting drill, against which the plants are laid at proper distances, the roots being spread fan-shape against it and covered with soil. The other is, to draw a drill row of sufficient width for the roots on either side of the crowns; then, with the corner of the hoe, slightly draw the soil from the two outer sides of such wide drill as to cause a ridge in the centre. Upon these ridges the crowns of the plants are made, so to speak, to ride, with thin roots spread out down its sides to the lower levels on both sides.

As the habit of the roots is to grow out somewhat horizontally at but a few degrees angle downwards, it is obvious this latter plan gives greater facilities to the roots to assume a natural position than when forced too directly downwards in a fan-like cluster, as by the former method.

When planting, insert the crowns 2 inches deep.

CUTTING.

It is all-important to cut when the shoots are of perfect uniform length. Each blade must be cut before the scales are in anywise rough or loose about its apex. When they are cut, bundle them, and stand them upright in a dark, cool place—*not in water*—so that the bundles can be added to from succeeding cuttings. Do not cut the bottoms of the bundles to the necessary length until required for packing. Bundles of various sizes consist of hundreds, half, and quarter hundreds.

In cutting, cut deep below the surface with a long, narrow-bladed knife.

NOTES ON MANURING.

All organic manures are suitable for use on the beds; but care must be exercised in the use of any of these, lest they be too hot and injure the plants, especially if applied directly to the roots and immediately over the crowns. When the young shoots come up through it fresh, hot manure is likely to produce rust, or to render the shoots unsightly, and thus injure their sale. Especially is this true in light sandy soils.

Tropical Industries.

RICE.

Whilst the cultivation of rice has fallen off in the Cairns district, the reverse is the case in the South. So satisfied are the farmers in the Pimpama district with the returns from that cereal during the past season, that they intend putting in a much larger area this year. A rice mill has also been erected, so that the paddy can be dealt with on the spot. Much of the land in the Logan, Coomera, and Nerang districts is eminently adapted for rice culture, whilst it is unsuitable for almost any other crop. In the Southern States of America, thousands of acres of what were considered perfectly valueless lands, so far as general agriculture is concerned, and consequently scarcely saleable at 10 dollars per acre, have, by means of the rice industry, risen in value to 50 dollars per acre, and it is predicted that in ten years Louisiana and Texas alone will produce sufficient rice to meet the world's demands. The land suitable for rice culture is thus described in the *Florida Agriculturist*:—

Experiments in other countries have shown that rice can be grown on a great variety of land, from the light sandy loams to the most uncompromising hog-wallow, provided the subsoil is firm enough to hold water. It does not grow equally well on all lands. On light sandy lands the crop is small; on very rich peaty lands it runs to straw. Firm, sandy loams and clay loams are the best lands for rice. Clay loams are the best, but are more difficult to be worked than rich sandy loams. Avoid land with large knobs. Even crops of rice cannot be produced on such land. Knobs not more than 8 or 10 inches high are not serious objections, for they will absorb sufficient water to produce a crop. Farmers generally prefer shallow ploughing for rice—3 to 4 inches. They claim that the binder sinks just as deep as the plough is run. For early fall ploughing a shallow furrow is best, because it leaves the seeds so near the surface that they will germinate. In running the disc over this fall ploughing, let it go deeper than the furrow by an inch.

Where fall ploughing is done so late that seeds will not germinate, plough deep, bury the seeds deep enough to rot them during the winter rains, but in deep ploughing avoid turning a flat furrow or too much of the vital surface soil is buried.

In preparing the soil for a crop too much care cannot be exercised in pulverising the soil perfectly. Disc and harrow and then do so some more till the surface is like a garden.

In sowing, drill the seeds in if possible; it saves seed and secures more uniform planting. As to the amount of seed used, two theories prevail. One is, to sow half a barrel to the acre and not expect much stooling. In fact, flood the land so soon that there will be only a few stalks from each seed. It is claimed that in this way more vigorous stalks and larger heads with more uniform berry will result. Others advocate lighter seeding—60 lb. per acre, and when good imported seed is used on rich land, it is claimed that 40 lb. are sufficient. Some of the largest and best crops that I have ever seen were produced from a seeding of 30 lb. to the acre. If the field is dry at sowing time, it is a good plan to put on enough water to wet it. Avoid ponding of water or standing water on such field. Simply saturate the soil and repeat it weekly until the grain is large enough to flood permanently. This will cause the rice to tiller and make rapid growth, which increases the crop.

A mistake is frequently made when the flooding season comes in putting on only about 1 inch of water and allowing it to remain. Such a thin stratum of water may become too warm and injure the rice. It is better to simply keep the soil saturated till the rice is large enough to receive 2 or 3 inches of water.

The Japanese keep a small stream of water running into the field continuously and flowing out into an adjoining field—*i.e.*, they never allow stagnant water in a rice field.

Some water must be added from time to time to keep up evaporation and absorption by the soil; if this can be done by allowing a flow from one field to another, it will be found advisable to do so.

Possibly a word should be added here about fertilising rice. On sandy loam soils it will be found profitable to use fertilisers. On our virgin soils, 60 lb. to the acre appears to be sufficient. It may be sown with a drill attachment at the time of seeding, or it may be sown broadcast after seeding. On virgin soil, a fertiliser of raw bone and acid phosphate has shown excellent results. On old land, some nitrogenous fertiliser like cotton-seed meal should be added, and more fertiliser per acre used. Care should be taken, however, to have it sown before planting where considerable fertiliser is used, otherwise it might injure the germ.

The low-lying lands on our coast are of various descriptions, from light sandy loam to heavy black soil and clay, whilst much of the swampy land is full of large knobs from 10 inches to 1 foot high. As Mr. Peek, in his excellent article on rice culture in the August issue of this *Journal*, remarked, all lands are not suitable for rice-growing. People are apt to think that, because they own a large, shallow swamp, they have the ideal land for the purpose, but this is not always the case, and it would be well, before going in for an extensive area, to experiment on a small plot, or to have the soil analysed. The lands mentioned in the American journal are, of course, such as are suited to the cultivation of the varieties of rice known as "Aman" and "Boro," or swamp rice, and are necessarily so situated that they can easily be flooded and drained dry. In the Pimpama and Northern districts the White Java upland rice is grown. This does not require to be flooded, and thus is more suitable to the means of the farmers. It does not, however, by any means follow that the swamp rice will never be grown in Queensland. On the contrary, as the country grows richer, and with more population, it is quite within the bounds of probability that the swamp rice will be extensively grown where plenty of water is available, and where the land is so situated that it can be inundated and dried off at pleasure. The Southern farmers deserve every credit for their enterprise in this industry, seeing what an enormous demand there is in the world for rice, since it forms the principal food of at least one-half of the people on the earth. The Chinese Empire contains 402,000,000 people; the British possessions in Asia, 291,000,000; Japan, 43,000,000; and other rice-eating nations, 90,000,000; a grand total of 826,000,000 people, of whose food rice constitutes at least one-half.

There are 1,400 varieties of rice known. It was first cultivated by Sir William Berkley, in Virginia, in 1647. Two hundred years later the rice grown in Georgia and in the two Carolinas amounted to 115,000,000 lb. Then Louisiana commenced the industry after the great Civil War, and in 1880 produced 86,000,000 lb. The highest production was 237,000,000 lb. in 1893, and since 1887 the average crop in that State has been 145,000,000 lb. annually, and 350,000,000 lb. for all the States. In Japan 7,000,000 acres of rice support about 43,000,000 people, giving to each person about $4\frac{1}{3}$ bushels, or 150 lb. of milled rice, per year. The Japanese and other rice-eating nations vary their rice diet with highly nitrogenous foods such as rye, barley, peas, beans, millet, buckwheat, rape, white potatoes, and sweet potatoes. The rice grown in Japan and South Carolina is the richest in fats, and consequently ranks highest in flavour and nutrition.

Queensland imports about 9,500,000 lb. of rice annually, of a value of £51,400.

If Queensland growers extend their cultivation in the same way as the farmers of the Southern States of North America, it will not be long before they will be in a position to supply the local demand and begin to export to the Southern States.

It takes $1\frac{1}{2}$ tons of "paddy" to produce 1 ton of marketable rice. Putting the return at 15 cwt. per acre of clean rice, ready for market, it would require an area of 5,655 acres to meet the requirements of Queensland alone. Thus, there need be no fears on the score of a local market for some years to come. Will it pay the farmer to grow rice? Mr. Peek says it will pay well. He puts down the crop at 40 bushels per acre, that is to say of paddy, which can be sold at the mill for from 4s. to 5s. per bushel. At the lower rate, the return would amount to £8, but if the rice were milled for the farmer he could sell the produce of 1 acre for £13. So it would appear that there is more profit in rice than in maize, to which some 120,000 acres are devoted, or wheat on 55,000 acres. It does not follow that a farmer should devote the whole of his attention to a rice crop. There are other crops, such as lucerne, maize, potatoes, barley, and oats, which may all be grown in conjunction with rice. It is by the exclusive growing of one crop that an industry often perishes, because one bad season, or at most two, causes the single-crop farmer such a heavy loss that he declares such and such a crop will not pay. If he had other crops to fall back upon he would not be dismayed by the failure of one, but would give it another trial, and then would probably be successful.

COTTON-GROWING IN RUSSIA.

The total consumption of cotton in Russia amounts to 270,000 tons per annum, of which quantity 120,000 tons are produced by Russian growers in Central Asia and Trans-Caucasia. The cotton scarcity of 1900 gave a great impetus to the native industry, and efforts are being made to render Russia independent of outside supplies. Very high prices have been obtained for the home-grown fibre during the past year, the spot price having risen from 7 roubles (15s. 7d.) to 11 roubles (£1 4s. 6d.) per poud (36 lb.), or from a little under $5\frac{1}{2}$d. per lb. to a fraction over $8\frac{1}{6}$d. per lb. If such a price were obtainable by Queensland growers, doubtless sugar, coffee, rice, and other tropical products, now occupying the attention of the Central and Northern farmers, would receive scant attention.

The average cost of producing, ginning, and marketing an acre of cotton in this State may be set down at £4 12s. 2d. On the basis of 1,000 lb. of seed cotton as the produce of an acre, the net profit at the Russian price would be £8 19s. 8d. per acre. With a crop of 500 lb. of clean cotton per acre, the profit would be £12 7s. 8d. To this must be added the value of the seed and hulls or, where machinery is available, of the hulls, oil, and oilcake. The wages in Russia range in wheat harvest time as high as 2s. per day for men and 1s. to 1s. 3d. for women.

In view of the possible rise in the price of raw cotton, owing to the increase of cotton-mills in the United States, and to the large demand for cotton in Japan, which last year imported over £6,000,000 worth, it would pay the Queensland farmers to put in areas of from 2 to 10 acres, which they could cultivate with no extra labour on the farm, and which could be picked either by contract or by the help of their families.

We are too apt, in this State, to put all our eggs into one basket; and when, as sometimes happens, the bottom falls out of the basket, the eggs are smashed and we call on Jupiter to help us. when we might all along have been helping ourselves by planting a diversity of crops.

THE CULTIVATION OF CACAO IN THE WEST INDIA ISLANDS.

The following account of the cultivation of cacao (or cocoa as it is usually called) in the West Indies, which we take from the *Scientific American*, will be of interest to our Northern readers. It is said to be the most inviting of agricultural pursuits. The island of Trinadad produces cocoa of a quality second to none and only equalled by that grown in the vicinity of Caracas

(Venezuela), and always brings the highest price in the British markets. Considerable patience is required to grow it from the seedlings, as it takes five or six years of cultivation before there is a harvest worth mentioning, and seven or eight years before a full crop can be realised; but when the trees are once full-grown they will continue to bear fruit for an almost indefinite time.

The cocoa tree seems to flourish best in the rich and well-watered soil along the banks of the many ravines that traverse the uplands of the island, where they are more or less protected from the violent storms. The small plants are reared in nursery grounds until they are 10 or 12 inches high, when they are planted in rows like a northern fruit orchard. The cocoa tree must always be protected from the powerful rays of the tropical sun that seem to blast the fruit. When young, they are shaded by growing bananas or plantains adjacent to the young tree: these grow very rapidly and furnish the required protection, as well as being the source of some profit while the cacao is too small to bear.

But it is necessary to provide for a future shade—for the cacao, after three or four years, outgrows the banana—and for this purpose a tree known as the "Bois Immortel" (sometimes called the "Mother of the Cacao") is planted at the same time as the cacao tree. This is a tall tree with high and spreading branches that form a sort of canopy over the entire cacao plantation and give it the required shade, making it resemble an open forest. The immortels are shown in the illustration immediately behind the dry-houses, with the smaller cacao trees underneath. The coffee tree, which is much smaller than the cacao, is often grown in small quantities amongst it.

The cultivation consists largely of draining the land, keeping down the undergrowth of brush and weeds, and pruning the trees. The flowers occur in clusters on the main branches and on the trunks of the trees, usually only one of each cluster reaching maturity. The fruit, which is seen in the illustration, is a hard pod, 6 or 7 inches long, resembling a cucumber, growing from the trunk or large branches, and looks very much as though it had been artificially attached. Buds, blossoms, and fruit in all stages occur side by side, and ripened fruit is harvested at all times of the year. The main crop, however, matures in the dry season, and is usually harvested in February; only small quantities ripening during the remainder of the year.

The pods each contain five rows of seeds or beans, quite similar to a large Lima bean, embedded in a pink acid pulp. These seeds are the cocoa beans of commerce. The harvesting consists of cutting off the mature pods by means of a knife on a long bamboo pole, gathering them into heaps on the ground, where they are allowed to lie for about twenty-four hours. They are then cut open with a cutlass, the seeds and pulp coming out in a mass; these are carried to the dry-house, which consists of a smooth, tight floor or platform set on posts at a height 4 or 5 feet above the ground to allow a free circulation of air underneath. A light iron T-rail is spiked on each side near the edge and extending one-half the length of the floor beyond each end; a corrugated iron roof, with its eaves level with the floor, covers the platform. This is carried on a frame, divided in the middle of the floor, mounted on small car wheels travelling on the rails. The drying of the beans is accomplished on the floor by spreading them over it and exposing them to the sun. The roofs are to protect them from the rain and dews, and are kept wheeled back on the extended tracks when the sun is shining. As soon as the beans reach the dry-house they are placed in the "sweat-box" or pit, where they are closed up tight and allowed to ferment for some time. This process requires very careful attention to prevent the temperature from getting too high and to stop the fermentation at the proper time to ensure the proper flavour, as well as the fitness for the preservation of the beans.

The next process is the drying on the floor. Labourers are kept constantly stirring them, while exposed to the sun, with a wooden rake, so that they will dry evenly. Each morning, during the early stages of the drying process, the beans are gathered into a heap in the middle of the floor and given

Plate XI.

1. Cacao Pods on the Tree.
2. Cacao Drying-houses in Trinidad—Mixing the Beans.

a thorough mixing. This is sometimes accomplished by the labourers mixing and kneading them by treading them with their bare feet, as shown in the illustration. This is known as "dancing the cocoa," and renders the beans smooth and uniform in colour. It usually requires ten days or two weeks to finish the drying, depending on the weather; a great many attempts have been made to dry the beans artificially, with more or less satisfactory results, but no general satisfactory drier has yet been designed, and the open dry-houses are in general use throughout the island. It only remains, however, for some ingenious mind to make a careful study of the requirements.

The most difficult problem seems to be to get an artificial drier that will give the proper colour to the dried beans—the brick-red colour, and the property of retaining it is a very important feature in the cocoa market.

The dried beans, when ready for market, are put in canvas bags holding about 150 lb., and the name of the plantation is stencilled on the bags, these brands becoming at times very prominent in the market.

The manufacturing, which is invariably done in northern factories, consists of roasting the beans in a revolving cylinder; this develops the aroma and fits them for crushing. After the beans are crushed they are screened to separate the "nibs" or crushed nuts from the shells. The nibs are then ground to a fine meal; this is put in sacks and placed in a powerful press, where it is subjected to heat and pressure, and the fat, known as "cocoa-butter," is squeezed out, and the hard substance left in the sack has only to be broken or powdered to become the pure chocolate, and this, more or less adulterated, is the chocolate of commerce.

PREVENTION OF COFFEE DISEASES.

In order to guard against the introduction of diseases into coffee plantations, Professor Dr. A. Zimmerman, Netherlands India, treated coffee beans intended for seed with sulphate of copper and lime. The germinating power of the seed was certainly found to be slightly affected by the process, since, in the first place, the germination was delayed, and, secondly, after treatment for twelve hours only 76 per cent. of the seeds germinated; after eighteen hours, only 71 per cent.; and after twenty-four hours, only 70 per cent. Still, the professor, in view of the object to be obtained, recommends the treatment, and advises the twenty-four hours' steeping, since the difference in the result in the case of eighteen hours is trifling.

THE WORLD'S SUGAR CROP.

The world's sugar crop of 1900 (says the Treasury Bureau of Statistics) amounted to 5,950,000 tons of beet sugar and 2,850,000 tons of cane sugar—that is, more than two-thirds of the sugar now produced is manufactured from beets. The rapid growth in the production of sugar from beets is shown by the fact that in 1840 beets supplied less than 5 per cent. of the world's sugar consumption; in 1850, this was 14 per cent.; in 1870, 34 per cent.; and in 1890, 67-71 per cent. In 1840 the total sugar consumption in the world was only 1,150,000 tons, as compared with 5,702,000 tons in 1890 and 8,800,000 tons in 1900. In the year ending September, 1900, Germany produced 1,950,000 tons of beet sugar, and France and Austria-Hungary each over 9,000,000 tons; Russia made 890,000 tons, and Belgium and Holland 340,000 and 170,000 tons respectively. Out of the total world's product of beet sugar, "other countries"—including the United States—only aggregated 400,000 tons. Java exported the largest crop of cane sugar, or 670,000 tons; and Cuba comes next with 500,000 tons; Louisiana made 340,000 tons, and Hawaii 230,000 tons.

THE POSITION OF GINGER.

For those Northern farmers who plant ginger, there is a hopeful lookout. The London ginger trade appears to hinge on the movement of ginger in Jamaica. *The London Commercial Record* says that, had it not been for the large supplies of this description, the present position of the market would be a totally different one to what it is. Jamaica ginger has been the millstone round our neck; its weight and low prices have frightened bull speculators, who, having regard to the favourable position of Indian sorts, appear ready to take up the article, and good and profitable business would have been the result. As it is, the season in India has practically closed for want of supplies, and the entire business done on arrival terms will hardly exceed 100 tons—a very poor result, indeed, compared with the large quantities which used to be contracted for in former years. We had become accustomed to look for some movement in ginger every season, but this year business has been confined to the Indian dealers and planters, who, it appears, have been operating against one another, much to the discomfort of the dealers, who, following a bear tactic, have been cornered, and will, no doubt, have to pay the piper for their rashness, unless, indeed, the hope expressed in some quarters be realised that some stocks are held back by planters with the view of squeezing prices still more. Whatever those stocks may be, they will, we fear, not alter the general conviction that the crop has turned out smaller than anticipated, that, in fact, it will be the smallest for many years past. It will take about one year before the next new crop makes its appearance; consumers will, therefore, do well to look after their stock, for it is not unreasonable to suppose that prices will experience a considerable advance, especially if the summer should prove a hot one.

THE WIREWORM.

A correspondent of the *Agricultural Gazette*, London, writes:—More than one farmer has declared that a dressing of rape dust is a remedy for wireworm, though it is not clear whether it acts by feeding or by disgusting the pest. One theory is that the wireworms gorge themselves upon the rape dust to such an extent that, "like the fly on the ceiling," in the old comic song, they "blow themselves up by spontaneous combustion." I sowed a quarter of a ton of rape dust upon an acre of land intended for tomatoes, about ten days before planting, and in setting the plants my men did not see a wireworm, although there were swarms of the grubs in parts of the field recently. There are potatoes adjoining, and perhaps the grubs have emigrated to that part of the field; but is there any evidence of their moving for any considerable distance? It is too good to hope that they have eaten the dust till they burst, or otherwise have been poisoned by it; but supposing that they were disgusted by it, and retired to an unusual depth in the soil, is it possible that they can have changed into the chrysalis stage prematurely? Or, supposing that they ate the rape dust and flourished upon it, have they changed to the chrysalis stage on that account? Miss Ormerod states that their life in the grub stage varies in length, and that it is supposed to be shortened by abundance of food; but quite as probable a supposition seems to me to be that their grub life is shortened by starvation. The fact should be borne in mind that the apparent success of a remedy may be really due to the grub stage of the pests in a particular field or spot having come to an end. How soon a fresh lot would hatch after the grubs have become first pupæ and afterwards click-beetles, does not appear to be certain. But does not an infected field become free from wireworm by natural means sometimes? If it does so, the method of clearance is mysterious. Are they starved as grubs, or do they fly away as beetles? Truly, there is abundant scope for the observation of the wireworm, as well as for testing thoroughly reported preventives or remedies in relation to it.

Forestry.

THE SCOTCH PINE.

This is one of the most valuable timber trees of Northern Europe. It would appear to adapt itself to any sort of soil. It will even grow well in sandy, gravelly soils and in dry exposed positions. It attains a height of from 60 to 100 feet.

Mr. H. J. Colbourn, holder of the Special Forestry Certificate, Inst. Surv. London, says of this tree:—

The largest trees and finest timber in the Highlands of Scotland are found growing on a light loamy soil, overlying a cold but dry subsoil, granitic in character. The roots of this pine in its native forests run along the surface of the ground, and even rise above it. The tree, indeed, appears to derive a considerable portion of its nutriment from the decay of its own leaves.

The Scotch pine produces the best wood when grown slowly in a cold climate, and it then acquires its darkest colour. The timber of this tree when rapidly grown is commonly white, soft, and spongy in texture, and destitute of resin. A tree which has grown slowly, when cut down, would be found to have its annual concentric rings about $\frac{1}{10}$ inch in thickness, whereas in a quickly grown specimen they would be found from $\frac{1}{6}$ to $\frac{1}{4}$ inch wide. If the wood of the Scotch pine is red and firm, it is very valuable for all kinds of indoor work, both on account of its being easily worked and for its durability, which is said to equal that of the oak in dry situations. It is at once straight, light, and stiff, on which account it is specially fitted for rafters, girders, joists, &c., which may be made of smaller dimensions of this timber than of any other.

Scotch pine wood burns easily, but produces a thick disagreeable smoke. The faggots of this tree are more valued by the chalk and lime burners of England than those of any other on account of their rapid burning and the intense heat they yield. The resinous juice of the Scotch pine produces tar, pitch, resin, turpentine, and the essential oil of turpentine which is employed in house painting.

The Scotch pine is adapted more than, perhaps, any other tree of the kind for planting in poor, dry soils and exposed situations. If employed for shelter purposes to break the force of the wind from any quarter, the trees should be planted far enough apart to enable them to preserve their bottom branches, which should reach to the ground. To form an effective means of protection, the young trees should be planted in rows two or three deep in alternate positions, as by this means they can be planted far enough apart to secure the requisite habit of growth when they shall have reached maturity.

The Scotch, like other pines, is propagated from seed, which may be readily shaken out of the cones after these have been dried well in the hot sun or in a moderately heated kiln.

The seeds should be sown in a somewhat shaded border of rich mould, and covered to a depth of from a quarter to half an inch. After being about a year in the seed bed, the young plants may be transplanted into nursery lines 15 inches apart, and 6 inches in the row, where they may remain two years, after which they may be removed to their final destination. If required a larger size, the young trees may have another remove to fresh nursery lines, in which case they are planted in rows 3 feet asunder and 18 inches in the row.

The Scotch pine, when planted with a view to the production of timber, should always be in large masses, to be afterwards thinned out. By this means the lower branches die while the trees are young, and the timber grows clean and free from knots to the higher branches. On the other hand, for shelter belts and ornamental purposes, the trees should be planted wider apart in order to enable them to retain their branches from the ground upwards.

The thinning from the plantations devoted to timber-raising may be usefully employed for fencing rails and similar purposes.

Everyone knows how well pine-trees of all descriptions flourish in Queensland. Wherever an imported tree of this family has been planted, it has invariably grown luxuriantly. There is then no reason why we should not have large areas devoted entirely to this tree, thus utilising much of the, at present, valueless Western country. The trees would also probably flourish on the prickly-pear infested country, especially as the roots run along the surface of the ground and derive much of their nourishment from their own *débris*. The prickly pear would prove a shelter for the roots from the hot sun, and also provide succulent nourishment from their dead leaves.

THE EFFECT OF PLANTING FOREST TREES.

There are large portions of hilly country in this State which are completely devoid of trees. Such bare hills may be seen in parts of the Blackall Range, where the soil is so shallow as to be only able to produce a slight covering of grass. In many places the soil is washed away, as may be seen in the Gilbert Ranges, towards the Etheridge country. Supposing these bare summits and hillsides to be planted with—and hence sheltered by—plantations of suitable timber, they would then serve as very important additions to the catchment areas of the Gilbert, Einasleigh, Lynd, Norman, and Flinders Rivers. Now, what is the effect of a growth of trees on these rocky slopes? Their roots are sent deep down through the fissures of the rocks. They act as wedges in bursting them asunder, then the soil and detritus washed down by the rain water collects in these enlarged fissures, the soil being enriched by the humus and vegetable matter, such as dead leaves, grass, &c. Then there is another action of the water and collected soil, which has been pointed out by Dr. Robert T. Cooper, M.A., M.D., in a pamphlet entitled, "Ireland's Real Grievance: the Reafforesting of the Country. Being part of a Lecture delivered in the Rotunda Rooms, Dublin, 15th September, 1900." He says:—

"The mould created thus by the discarded constituents of the trees is further added to, owing to its agency in disintegration of the rock upon which it rests. This is owing to the vegetable constituents forming, with its contained moisture, humic and other acids; these tend to dissolve out the silica and other hard constituents of the rocks, and in this way the rocks themselves contribute additions that go to the formation of a rich manurial mould. A rock thus covered over with fertile mould, and this mould situated under the shade and protection of a tree, is placed in the best possible condition for resisting the devastating effects of storms and torrential rains, their injurious influence being still more minimised by the intercepting medium formed by the pyramidal expansion of the trees. The washdown, therefore, from the declivities of the mountains, instead of being torrential and destructive, becomes, thanks to the agency of trees, gradual, creative, and regenerative; thus conducing to the enrichment in soil of the low-lying expansions of the country, to infiltration of moisture into the agricultural soil, and to the gradual oozing from it into the adjoining water-channels of a liquid purified, drinkable, and well filtered."

Dr. Alex. Japp, L.L.D., &c., writing on this subject, says that where, as in Ireland and Scotland, the substratum is impervious and rocky, the soil thin, and apt to be washed away completely by overpowering rains to the sea, and all the enriching and fruitful elements lost, if crops are to be got, they must be supplied laboriously and at great cost by science and industry.

During the great flood of 1893, in this State, the aforementioned enriching elements were washed from thousands of acres into the rivers and thence to the sea. The rivers were thick with these fruitful elements. Now, a river should consist of the rainfall that has undergone as efficient a filtration through the agricultural soil of the country as is possible, and not by torrential rains, of a

washdown of mould from the mountains, or of surface-washings from the pastured, ploughed, or cultivated fields.

In Queensland, as in Ireland and Scotland, from lack of tree-growth, in many districts, we suffer in measure precisely as they suffer in the imperfectly forested parts of Africa.

Dr. Japp, continuing, says:—

"Now, what must we infer from all this, the condition in which our country stands from its neglect, dire and sad, of afforestation? In the first place, it is allowing wealth—more precious than the golden grains rolled down by African rivers—to be washed away; for here it is the very soil, the land itself and its fruitful possibilities, that, with every rain and flood, is being swept out to sea. Secondly, the country is yearly paying away many millions for what it could itself produce under a thorough and scientific system of reafforestation. Other countries *act* more wisely if they do not *know* better than we do. No portion of the country must be waste: if a man cuts down trees, he is compelled by law to replant, if he does not plough or make pasturage there. If he won't do this within a certain period, the Government in due time will resume possession, and itself, by its Forest Department, replant that area with suitable tree-growth. Germany, Russia, Sweden, Denmark, and Norway have this law. The result is that we are now dependent on them for timber, as we are dependent on Russia and America not only for grain, but, to a large extent, for our butcher-meat. To us it does appear as though the situation were ominous. We have the reform absolutely in our own hands. But our 'statesmen' are so much engaged with other things—with Party manœuvres, with this, that, and the other—that they have no thought for this and such as this. Circumstances might easily arise to cut us off for long periods from our present sources of supply. Nay, these very sources of supply, at least at several points, are sure, in course of time, to lessen, from the swift populating of new countries. We are insular—that has its advantages; but, alas! it may also have its tragic disadvantages. Ordinary discretion, since we are geographically insulated, might lead us to aim at being as nearly as possible self-contained and self-sustained. This, with no suggestion of any reserve or dislike to those on whom we are dependent, but solely on the ground of the true interests of our own people.

"If we produced more, if land were more fruitful, well and skilfully cultivated, and were more widely used in some form or other, then it is clear that, with every increased quarter of wheat raised, every additional ton of corn and rye grown, every additional acre of barley reaped, we were extending our own home-markets on which in all circumstances we could depend, and making ourselves independent of distant markets on which owing, among other things, to keen competition, destined to be yet keener and keener, as the good Bishop of Manchester the other day so significantly warned us, we can less and less securely depend. Much has been changed, much more yet will be changed by the tremendous fact that we are no longer the one only coal and iron producing and steel-working country in the world. No; even there, others, by applications of chemical and scientific knowledge—Germany and America are outstripping us—have so improved their machinery and their processes that they can beat us both as to quality and time needed; and more, can undersell us. Surely, in such case, wise men would think of husbanding resources, of laying by or laying up for a rainy day. Yes; laying by and laying up for a rainy day, even by so covering the waste and wasteful places of our land with miracle-working trees. For the tree by its roots seizes water and transpires by its leaves the excess, thus preventing torrential floods—one oak thus lifts in a season of leafage nigh 150 tons of water. No corner, not even the rock itself, as Dr. Cooper anew points out, but they could be grown on; no bog, swamp, or morass but could be made to yield. Even an Irish bog set out with alders, willows, sallows, and other water-loving trees, birches and firs on the higher and drier reaches, what a double source of wealth were that for one and all of us!"

Science.

SOME FIGURES SHOWING THE FIRST COST AND OPERATION OF COTTON-MILLS IN THE SOUTHERN STATES OF NORTH AMERICA.

During the last seventy years the cotton-mills in the United States have increased from 10,000 spindles to 500,000, working in 485 mills. All these mills are not to be found everywhere in the south, for there are none in Florida, only half-a-dozen in Texas, and very few in Kentucky or Virginia. The *Scientific American* says that the principal activity in construction of cotton-mills has been confined to the South Atlantic and Gulf States, beginning in North Carolina and ending at the Mississippi River, although a beginning has been made in Arkansas, as well as Oklahoma, and in the Indian territories. An idea of the rapidity of construction may be gained when it is stated that the number of mills built in the south during 1900 was about 100 compared with seventy-five during the previous year. In 1895 the number had increased to 390, representing about 3,500,000 spindles. Here is shown a gain in five years alone of over 100 per cent. During the present year the lowest number of spindles projected is estimated to be somewhat less than in 1900, but the tendency in the south has been to increase the number of spindles and looms installed in a single mill, so that the total amount of machinery will be practically more than that erected during 1900. The figures showing the cost of mill construction, and those which follow, are based on estimates made of plants which have been constructed. The sum of 75,000 dollars (£15,000) will build and equip a plant ready for operation, containing from 3,000 to 4,500 spindles, according to the size of the yarn it is to produce.

The sum of 100,000 dollars (£20,000) is sufficient for a mill ranging from 4,000 to 6,000 spindles, whilst 175,000 dollars (£35,000) will complete a 13,000 spindle plant. These prices include a brick and stone building, with heavy framework, containing fire protection, electric lights, steam heating, a water supply, all other tenements for the necessary staff of operatives, and warehouses for storing cotton.

A 75,000 dollars (£15,000) plant will consume fifty to sixty bales of cotton per week, working on No. 8 yarn, or from twenty-five to thirty bales working on a finer product—No. 30, for example.

In calculating these figures, an estimate of 15 per cent. is allowed for waste of material by soiling, the amount taken out in going through the various processes, and the shrinkage.

To operate such a mill with 6,000 spindles, forty operatives are required for spinning alone. The labour is calculated to represent 15 per cent. of the total cost of the product when coarse goods are made, the raw material 65 per cent., and the depreciation of the plant and other expenses the balance.

The organisation of the company operating a mill of 10,000 spindles and 320 looms, generally consists of a president, a treasurer and secretary, and a superintendent. These three form the executive heads of the departments, the secretary acting as bookkeeper. No large salaries are paid, that of the president being sometimes as low as 2,500 dollars (£500), whilst the superintendent receives from 1,500 to 2,000 dollars (£300 to £400), and the secretary from 1,200 to 1,600 dollars (£240 to £320). Salaries increase, of course, according to the size of the mill.

The president of a plant of, say, 75,000 to 100,000 spindles, may receive from 12,000 to 15,000 dollars (£2,400 to £3,000) annually.

The cost for power of course varies, but upon averages secured from several mills it varies in proportion to the size, operated under different conditions. Steam costs per horse-power per year from 12·50 to 17·50 dollars (£2 12s. 1d. to £2 12s. 11d.)

Water power varies from 7·50 to 15 dollars (£1 11s. 3d. to £3) where the power is applied directly to the machinery and not used for electrical generation. It is calculated that from 6 to 8 tons of coal per day are sufficient to operate a 400 horse-power engine during eleven hours' continual service.

About one and a-half cords of pine wood are equal to 1 ton of coal.

The wages paid to the hands include one spinner at 1·50 dollars (6s.), six boys at from 40 to 75 cents (1s. 8d. to 3s. 1d.) each, and twelve girls at 26 cents (1s. 1d.) each.

The combination of advantages the manufacturers have enjoyed has enabled a few of the companies to earn enough to declare, if they desired, a dividend of from 10 to 15 per cent. annually, after allowing from 8 to 10 per cent. for depreciation of machinery and buildings. Few such dividends are announced, however, as it has been the general policy of late years to add to the surplus, making it a fund for enlargement and betterment.

This is why quite a number of the Carolina mills have doubled their capacity within the last ten years, putting aside so much for enlargement out of the profits of the original plant.

One mill located at Gaffney, South Carolina, earned 22 per cent. yearly for the first three years it was in operation, and its machinery operated twenty-two hours out of twenty-four during the first two years. It manufactured a certain grade of sheeting, and during the period mentioned actually controlled the prices of the American market.

Instances are also known of mills which have cleared as high as 30 per cent. in a year on their capital stock, or enough to give shareholders a dividend of 20 per cent. after allowing for wear and tear and new machinery. The inducements to build mills have resulted in possibly a score of similar plants being built on the instalment plan.

There are several of this character in South Carolina; for instance, a 1,000,000-dollar (£200,000) company would be recognised, divided into 1,000 shares of 100 dollars (£20) each, each shareholder being allowed to buy at the rate of 50 cents (2s. 1d.) per week per share, the idea being to have the stock fully paid up at the end of two or three years. As soon as 25,000 dollars (£5,000), or enough had been accumulated to start work, contracts would be let for a certain portion of the mill building. By and by it would be finished, and a small amount of machinery installed and started, the balance of the machinery being added as subscriptions were made to capital stock. The employees were actually helping to pay for the plant out of the wages received from the company. The plan followed is quite similar to that pursued by building and loan societies.

The mills in the south manufacture 17 per cent. of the cotton products in the United States, which represents 70 per cent. of the world's production.

The whole consumption of southern cotton is rapidly increasing, as may be imagined from the activity in mill-building, and calculations have been made that at the present rate of progress fully 5,000,000 bales will be converted into cotton yarn and cloth in 1901 by the plants in the sections referred to.

HOW TO PLANT CUTTINGS.

Many amateurs make great mistakes in planting cuttings. They leave three-fourths of the length of the cutting above ground, and very often push the cutting down by main force into the soil. The most successful way is to make cuttings from 6 to 12 inches long. Make a narrow trench, and put 1 inch of sand at the bottom, and place the cuttings at such a depth that only about two eyes or buds are exposed above ground. Throw a little more sand against the base of the cutting, fill in the soil a little at a time, and tread it very firmly against the base of the cutting. Leave the surface loose.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1900.							1901.					
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
North.													
Bowen	1·14	0·96	0·76	0·12	0·31	0·05	2·30	17·25	6·23	8·26	4·75	0·94	0·19
Cairns	1·66	0·20	Nil.	2·44	1·52	1·61	4·19	11·53	22·09	14·93	8·87	13·18	0·57
Geraldton	2·34	1·02	Nil.	2·63	3·17	2·39	18·68	23·32	32·93	37·64	26·10	26·72	1·21
Herberton	0·12	0·98	Nil.	0·74	Nil.	3·11	4·01	8·25	4·16	10·95	2·87	3·80	0·18
Hughenden	0·02	2·45	Nil.	0·14	Nil.	0·10	0·61	1·62	1·41	2·82	1·74	3·48	0·03
Kamerunga	Nil.	0·18	0·03	1·42	1·98	1·28	2·38	15·91	22·36	13·09	9·57	13·18	1·57
Longreach	Nil.	2·34	0·50	Nil.	Nil.	0·19	0·11	0·41	0·22	3·09	2·56	5·95	0·09
Lucinda	1·10	1·04	0·08	0·44	1·33	0·88	2·48	31·80	24·76	15·78	9·16	8·63	2·89
Mackay	2·00	3·25	0·74	1·19	0·48	0·12	7·00	24·85	8·99	10·13	6·80	1·32	0·25
Rockhampton	0·71	1·70	0·92	2·52	0·53	1·15	0·68	0·49	8·26	5·53	2·84	0·79	0·24
Townsville	0·41	0·57	0·12	0·25	0·91	0·05	0·76	14·91	12·94	4·95	3·13	0·74	0·32
South.													
Barcaldine	0·29	4·38	1·63	0·03	Nil.	0·30	1·20	0·15	1·17	3·70	1·90	2·21	0·82
Beenleigh	2·18	4·77	1·06	1·90	0·26	2·80	1·49	5·99	4·30	11·44	4·17	4·55	4·15
Biggenden	1·43	3·23	0·98	3·07	0·87	1·65	0·06	1·11	2·55	6·19	6·35	1·47	1·60
Blackall	0·33	2·21	0·66	0·12	Nil.	0·29	0·17	0·29	0·90	2·28	3·96	3·80	0·90
Brisbane	2·68	4·36	0·79	1·52	0·14	2·48	0·55	3·43	2·96	11·70	3·10	2·29	3·29
Bundaberg	1·46	5·20	1·14	1·56	3·05	1·06	1·28	2·34	2·61	3·17	10·27	1·14	0·74
Caboolture	2·14	3·73	1·56	2·94	1·99	0·86	2·11	1·11	5·51	11·53	4·64	3·34	2·27
Charleville	1·31	1·80	0·13	0·59	0·13	0·19	1·13	0·19	0·22	1·10	2·61	3·28	0·93
Dalby	1·29	1·70	1·72	1·67	Nil.	1·77	3·37	2·89	0·44	4·77	3·12	1·12	3·59
Emerald	1·15	3·96	0·52	0·35	0·18	0·31	1·08	3·65	4·43	3·25	0·88	1·31	0·63
Esk	1·89	2·85	1·39	3·00	Nil.	1·35	1·80	3·99	3·15	8·36	4·11	1·78	2·45
Gatton College ...	1·15	2·73	1·33	2·81	Nil.	4·12	0·47	6·27	1·54	6·73	3·86	1·55	2·93
Gayndah	0·88	3·36	1·42	3·28	3·21	1·84	0·08	1·22	2·10	4·22	3·97	0·97	2·32
Gindie	0·92	3·01	0·55	0·22	0·27	0·49	1·32	1·57	1·62	2·07	0·44	1·21	0·84
Gympie	0·82	3·34	0·84	5·67	0·18	0·84	0·47	2·57	3·10	18·56	3·89	3·38	2·82
Ipswich	1·45	2·25	1·17	1·37	0·01	3·93	0·47	2·09	2·88	7·01	3·38	1·43	3·16
Laidley	1·41	2·28	1·08	2·39	Nil.	4·55	0·63	4·01	1·58	6·94	3·81	1·47	2·54
Maryborough	1·21	4·32	0·57	3·55	1·22	0·68	1·18	5·03	5·51	11·76	5·58	4·09	2·22
Nambour	1·35	3·42	1·81	4·15	0·52	1·91	2·19	4·25	9·13	18·01	3·33	7·25	3·33
Nerang	2·84	7·74	1·08	2·79	0·26	3·02	2·92	4·26	4·22	14·91	5·12	5·42	5·34
Roma	2·14	2·14	1·05	0·77	0·66	2·20	3·28	1·13	0·11	1·77	1·11	1·11	2·66
Stanthorpe	1·22	2·26	1·50	3·98	0·23	2·17	2·16	1·94	0·80	3·95	2·13	0·77	2·74
Taroom	1·40	2·46	2·92	2·26	1·47	0·45	0·29	1·40	0·10	3·15	1·88	1·70	2·19
Tambo	1·49	1·75	0·59	0·19	Nil.	1·87	1·52	0·52	0·51	1·66	2·75	2·85	1·47
Tewantin	3·03	5·89	1·97	5·78	1·48	0·74	0·95	7·04	14·18	20·33	11·70	12·20	5·45
Texas	1·86	2·72	0·66	2·68	0·35	2·67	3·33	1·29	1·35	4·58	1·46	1·10	1·87
Toowoomba	1·69	2·47	1·35	1·95	0·43	2·42	2·40	3·60	1·76	6·84	6·59	1·04	3·57
Warwick	1·23	1·99	1·11	2·72	0·13	2·01	2·50	2·90	0·26	5·56	2·91	0·82	3·47
Westbrook	1·16	1·85	1·18	0·60	0·04	4·59	1·35	1·88	0·73	4·37	3·38	0·74	3·48

CLEMENT L. WRAGGE,
Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—(Duty free) Australian, 92s. to 101s.; Danish, 100s. to 106s.; Canadian, 96s. to 103s.

CHEESE.—(Duty free) American, 45s. to 47s.; Canadian, 44s. to 48s.; New Zealand, 43s. to 48s.; Australian, 38s. to 48s. per cwt.

SUGAR.—(Duties, raw, 2s. to 3s. 10d.; refined, 4s. 2d. and ¼ per cent.) Refined, £17 10s. to £19 10s. per ton; German beet, 88 per cent., 9s. 2¾d. per cwt.

SYRUPS.—(Duty, 2s. per cwt. and ¼ per cent.) Finest, 17s. per cwt.

MOLASSES.—(Duty, 2s. per cwt. and ¼ per cent.) 6s. to 8s. 6d. per cwt.

RICE.—(Duty free) Rangoon, £9 to £16; Japan, £14 to £22; Java, £21 to £26; Patna, £20 to £24 per ton; Queensland (Pimpama Island), valued at £18 10s. in the London market.

COFFEE.—(In bond, duty 1½d. per lb. and ¼ per cent.) Ceylon plantation, small to good middling, 40s. to 75s.; good to finest, 80s. to 106s.; peaberry, 50s. to 110s.; Santos, 30s. to 50s.; Mocha, 68s. to 80s.; Jamaica, finest, 90s. to 106s. per cwt.

ARROWROOT.—St. Vincent, 1¾d. to 4½d.; Natal, 5½d. to 7½d.; Bermuda, 1s. 6d. to 1s. 9d. per lb.

WHEAT.—Australian, white, 29s. to 29s. 3d.; New Zealand, white, 29s. 3d.; Duluth, red, 32s. 6d.; Manitoba, red, 32s. 6d.

FLOUR.—Australian, 18s. to 21s. per 280 lb.

MALTING BARLEY.—English, 26s. 6d. to 27s. 6d. to 32s.; Californian, 25s. to 27s.; New Zealand, 25s. to 28s. per 448 lb.

OATS.—New Zealand, 23s. 6d. to 26s. per 384 lb.; Canadian, 16s. 9d. to 17s. per 320 lb.

SPLIT PEAS.—41s. per 504 lb.

GINGER.—(Duty free) Calicut, good medium, 80s. to 95s.; medium, cut rough, 50s. to 70s.; small, cut rough, 30s. to 34s.; Japan, rough, 33s. to 35s.; Jamaica, good bright, 66s.; middling to fair, 40s. to 47s. per cwt.

PEPPER.—Capsicums, 15s. to 80s.; chillies, 35s. to 50s. per cwt.

TOBACCO.—A sample of Victorian strips is reported to have been valued at from 6d. to 7¾d. per lb. American: Thomas H. Edwards and Co., Liverpool, report the following prices:—

LEAF.	1901.
WESTERN—	
Common Export	— @ —
African Export	— @ 5 @ 6½
Short Trade	3 @ 4
Medium to good Trade	4½ @ 6
BURLEY	6 @ 7½ @ 8
VIRGINIA DARK—	
Common Export	none
Short Trade	— @ 3½
Medium Trade	4 ,, 5
Good to fine Trade	5¼ @ —
VIRGINIA AND CAROLINA BRIGHT—	
Common or Semi-bright	4 @ 6
Medium or Mixed	6½ @ 8 @ —
Good to fine	9½ @ 11 @ 15

Stocks on hand, 30th June: Leaf, 18,680 hogsheads; strips, 73,416 hogsheads; or 95,000,000 lb.

WINE.—Prices remain as quoted last month.

GREEN FRUIT.—Apples, Australian, 8s. to 15s. per case; pineapples, 3s. to 5s. each; oranges, common, 15s. to 17s.; medium, 17s. 6d. to 18s.; fine, 22s. to 24s.; finest selected, 25s. to 32s. per 420; lemons, finest selected, 13s. per case; bananas, 9s. per bunch.

COTTON.—Clean upland, 5½d. per lb.

COTTON SEED.—£7 per ton.

COTTON-SEED OIL CAKE (decorticated).—£6 2s. 6d. to £6 10s. per ton.

COTTON-SEED OIL.—Crude, £21 15s. per ton.

LINSEED.—51s. to 55s. per 416 lb.

Linseed Oil.—£32 per ton.

Linseed Oil Cake.—£7 7s. 6d. to £7 10s. per ton.

Manila Hemp.—£25 to £30 per ton.

New Zealand Hemp.—£24 per ton.

Wool.—The London market is firm, and prices may be expected to remain at present rates.

Frozen Meat.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison) :—

New Zealand Mutton.
(Crossbred Wethers and Merino Ewes.)

	August 3.	August 10.
Canterbury	$3\frac{3}{4}$d.	$3\frac{3}{4}$d.
Dunedin and Southland	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
North Island	3 1/16d.	$3\frac{1}{8}$d.

Australian Mutton.
(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	$2\frac{5}{8}$d.	$2\frac{5}{8}$d.
Light (under 50 lb.)	$2\frac{5}{8}$d.	$2\frac{3}{4}$d.

River Plate Mutton.
(Crossbred and Merino Wethers.)

Heavy	2 11/16d.	$2\frac{7}{8}$d.
Light	2 11/16d.	$2\frac{7}{8}$d.

New Zealand Lambs.

Prime Canterbury (32 lb. to 42 lb.)	$4\frac{7}{8}$d.	$4\frac{3}{4}$d.
Fair average	4 9/16d.	$4\frac{1}{2}$d.

Australian Lambs.

Prime (32 lb. to 40 lb.)	—	—
Fair average	—	—

New Zealand Frozen Beef.
(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	2d.	2 1/16d.
Ox, hinds (180 lb. to 200 lb.) ...	$3\frac{3}{4}$d.	$3\frac{3}{4}$d.

Australian Frozen Beef.
(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	$1\frac{3}{4}$d.	$1\frac{7}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	$3\frac{3}{4}$d.	$2\frac{1}{2}$d.

These prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotation is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

Bacon.—Irish, 64s. to 70s.; American, 47s. to 50s.; Canadian, 54s. to 64s. per cwt.

Hams.—Irish, 86s. to 96s.; American, 48s. to 58s. per cwt.

Hides.—In fair demand at last quotations.

Tallow.—Beef, fine, £26 10s.; mutton, fine, £27 10s. per ton.

Animal Pathology.

EXPERIMENTAL TRANSMISSION OF BOVINE MALARIA, CONTINUED FROM PART 2, AUGUST, 1901.

(By Dr. J. Lignieres, Chief of Staff, Veterinary College, Alfort, Specialist selected by the Pasteur Institute to investigate the infectious diseases of cattle in the Argentina Republic.)

(Translated by A. J. Boyd.)

DIFFERENTIAL DIAGNOSIS.

Bovine malaria may be especially confounded with anthrax.

By the symptoms, their progress, and their termination, these two diseases may be very easily distinguished.

In anthrax, one, so to speak, scarcely notices that the animals are sick, so rapid is the progress of the disease. A cure is quite exceptional. The mucous membranes of the diseased animal are violet-coloured.

In bovine malaria one also sees cases almost lightning-like in their progress, but, as a general rule, the affection lasts longer—for four or eight or more days. Cures are more frequent: the mucous membranes are generally very pale.

In malaria the urine is hæmogloburinic, rarely hæmaturic in cattle anthrax.

Finally, in this latter affection, the diarrhœic excreta are almost always blood-streaked, whilst in malaria they are seen to have a very special rusty colour, and to be slightly or not at all stained with blood.

These, then, are the principal distinctive characteristics. In the *post-mortem*, less plain differences are met with. I will even say that, as far as the lesions are concerned, the two diseases are very similar.

The following table sums up the principal differential characteristics of the macroscopic lesions:—

Bovine Malaria.	Anthrax.
Spleen—enormous, deep-coloured, often hard.	Spleen—very large, with black pulp, soft, semi-liquid.
Liver—often yellowish, with a clotted bile, abundant.	Liver—always violet, with fluid bile.
Kidneys—almost black, or else very pale.	Kidneys—always congested.
Urine—often hæmoglobinuric.	Urine—never hæmoglobinuric, and rarely hæmaturic*.
Lymphatic glands — lymphatic, little hypertrophied, rarely hæmorrhagic.	Lymphatic glands — lymphatic, very hypertrophied, often hæmorrhagic and black; externally œdematous.
Muscles—of normal colour, apparently healthy.	Muscles—always feverish, of a greyish colour, with a special odour called "feverish."
Blood—generally clear, coagulating well, reddening at first, then assuming a deeper colour.	Blood — thick, muddy, violet-coloured, coagulating and reddening badly from the moment of exit from the blood-vessels.

I particularly describe the appearance of the muscles which so well distinguishes malaria from anthrax; it is, perhaps, of all the differential characteristics, the most constant.

The microscopic examination establishes an absolute difference between the two diseases.

Whilst one detects in the blood, in the organs, and, above all, in the spleen of animals affected by anthrax, whether in a fresh state, or after Gram staining, the specific small rods of Davaine, nothing similar is seen in bovine malaria. Instead of *bacterides*, one finds in the red blood-corpuscles, principally in those of the kidneys, piriform or rounded hæmatozoa, which do not take the Gram stain, but fairly well take the methylene blue.

* For my part, I have never observed hæmaturia in cattle anthrax, whilst this lesion is so common in that of sheep.

It must, however, be remembered that the *Piroplasma bigeminum* may be rare or even absent in the blood.

The differential diagnostic may further be made by counting the red corpuscles, which often reach a very low figure in bovine malaria, which does not happen in cases of anthrax.

Lastly, experimental inoculations complete and ensure the diagnostic.

Bovine malaria can only be given by inoculation to cattle; the guinea-pig, the rabbit, the sheep, the goat, the carnivora, the pig, the horse, &c., are refractory. Anthrax, on the contrary, may kill all these animals. The guinea-pig and the rabbit, which receive one or two drops of anthrax blood under the skin, die within from 48 to 60 hours.

Some authors have seen a certain analogy between bovine malaria and bovine plague.

It is very easy to distinguish these two diseases by the symptoms and lesions.

Malaria is never so violent as bovine plague. The latter has no connection with ticks any more than has anthrax to do with them. In bovine plague the mucous membranes are the seat of specific accidents which are never met with in malaria.

With regard to experimental inoculation, when bovine plague is in question, all the parts of the organism are virulent, especially for the bullock, the sheep, the goat, and even the pig.*

When one has to do with malaria, the blood alone, or even the vascular organs, can give the disease to a bullock.

We shall see, by and by, that the *Piroplasma bigeminum* may be met with in plague-stricken animals; in this case, the inoculation of the sheep, impervious to malaria, but sensitive to bovine plague, will be a sure diagnostic.

Lastly, what we know of bovine malaria enables us also to distinguish it from aphtous fever, gangrenous influenza, epizootic dysentery, poisonings, and pasteurellosis (?).

The appearance of anæmic and enfeebled cattle in the virulent form of bovine malaria is, perhaps, approached by that presented by animals attacked by chronic bovine pasteurellosis. In the province of Entre-Rios I have often seen mistakes of this kind made in diagnosis. However, the alteration of the blood-vessels, the ossification of the lungs, and the different localisations possible on the viscera, suffice to characterise the chronic form of bovine pasteurellosis.†

Further, the number of red corpuscles, whatever may be the gravity of the anæmia, is infinitely higher in bovine pasteurellosis than in malaria.

PROGNOSTIC.

The disease presents more gravity amongst delicate animals, and during the great summer heats. The appearance of the hæmoglobinurea always aggravates the symptoms. Still, it is well always to hold judgment in reserve if it becomes a question as to what will be the termination of the disease. It often happens that animals which appear to stand very well an extremely high rate of corpuscular destruction, succumb suddenly in twenty-four hours; others, apparently very sick, recover little by little; lastly, in atypical forms, death supervenes without a great loss of corpuscles and sometimes without hæmatozoa in the blood of the general circulation.

The appearance of giant multi-nucleated corpuscles is an almost absolutely certain sign of recovery.

TREATMENT.

A host of substances has been employed in the treatment of bovine malaria, the salts of quinine, methylene blue, arsenical compounds, salicylate of soda, and above all, purgatives. Not one of these substances contains true curative properties.

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* Carré and Fraimbault: Annals of the Pasteur Institute; December, 1898.

† Lignières: Contribution to the Study of Bovine Pasteurellosis—Bulletin de la Société Australe de Médécine Vétérinaire; 30th December, 1898.

Quinine, which gives such happy results in human malarial fever, is utterly insufficient for bovine malaria.

At the beginning of the disease, or during its course, I have used sub-cutaneous injections of sulphate and chlorohydrate of quinine in doses of one, two, five, and up to ten grammes daily, without the animal deriving any benefit whatever from it. Rather, the preventive injections have proved utterly inefficacious. The animals injected with quinine for two or three days, and which afterwards received a virulent injection, took the fever with the same delay and with the same gravity as the controls.

Example :—

On September 10 a bullock received sub-cutaneously ten grammes of sulphate of quinine.*

On the 11th and 12th I renewed the injection. On the 13th it was inoculated sub-cutaneously in the connective tissue, with one quarter of a cubic centimetre of virulent blood, at the same time as a control.

September	14th.—	Temperature,	38°8 C.	
,,	15th	,,	38°8 C.	
,,	16th	,,	38°8 C.	
,,	17th	,,	99°2 C.	
,,	18th	,,	39°3 C.	Up to this day I found nothing in the corpuscles; it was the same with the control.
,,	19th	,,	38°8 C.	Very few *Piroplasma ;* I found none in the control.
,,	20th	,,	39°6 C.	Hæmatozöa are easily detected; I found a few stray ones in the control.
,,	21st	,,	41°4 C.	The urine is deep red, the hæmatozoa very numerous; the control is not so ill.
,,	22nd	,,	40°5 C.	Urine red, animal very depressed; many hæmatozoa. The urine of the control is red, and its temperature high (40°7 C).

September 23rd.—Temperature, 39°6 C. Urine deep red; hæmatozoa less numerous. The control appears to be doing equally well.

September 24th.—Temperature, 38°8 C.; control, 38°5 C. Both have become convalescent. The animal which received the preventive treatment with quinine has been a little worse than the control.

I have also exhibited quinquina as a drench† without obtaining any appreciable result. As may be seen by the action of quinine, the micro-organism of bovine malaria is different again from the hæmatozoa of Laveran.

I have also used methylene blue, 3 to 5 grammes in pills; salicylate of soda in doses of 10, 20, 30 up to 50 grammes daily; arsenious acid, 2 to 5 grammes in twenty-four hours; cacodylate of soda in sub-cutaneous injections—0 gr. 50—without effecting any more cures than if I had left the animals untreated. Chloride of sodium—common salt—and purgatives in general, have appeared to give good results, because they were specially used for the obstinate constipation which comes on at the moment of convalescence. Perhaps, in these cases, the purgatives help the organism to rehabilitate itself quicker.

Blood-letting and mustard poultices succeeded with a certain number of patients and remained without effect in others.

To sum up, we have, up to the present day, no mode of treatment truly efficacious and worthy of being employed above all others. On the contrary, it is acting wisely to keep the diseased beasts away from all excitement, and as much as possible, in summer, to shelter them from the rays of the sun. Violent efforts and forced marches are aggravating circumstances of the first order. I have often seen bulls die shortly after a painful march of from 4 to 500 metres.

The affected animals should be given food which is refreshing and easy of digestion—green food for preference.

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* Sulphate of quinine, 10 grammes; distilled water, 100 grammes; tartaric acid, 5 grammes. Dissolve by heat.

† 20, 50, or 100 grammes of powdered quinquina.

PROPHYLACTIC.

We must look to a prophylactic to furnish the means of putting on the drag and combating the bovine malaria.

In the etiology of this disorder, two inseparable factors play the principal part: the hæmatozoa and its intermediary, the tick. Whether we prevent the action of one or the other, the result is identical; the disease is prevented. We shall, therefore, divide this chapter into two parts—one relating to ticks, the other to hæmatozoa.

I.—MEASURES AGAINST TICKS.

I have endeavoured to point out the danger of travelling stock on foot in the infested zones. Not only is there a risk of a certain number dying, but the survivors may carry with them infectant ticks and thus create new homes of malaria in fields up to that time free. Especially when it is a question of transporting breeding cattle, should they, as much as possible, travel by train, and as a corollary, the trucks should be carefully cleaned and disinfected before being used for the transport of stock. In certain countries, no ticks, to speak of, are found in winter; that season, then, is the most favourable for moving stock.

It has been tried, particularly in the United States and in Australia, to destroy the ticks on animals destined for districts free from malaria. For this purpose very ingenious dips have been used, but the results are not commensurate with the labour and expense entailed.

It is practically impossible to destroy the ticks in the field. All that can be done with advantage is to set fire to the grass from time to time, when it is too high and too dry for cattle to eat.

Since observation and experiment have shown that calves resist natural infection and become immune, it has been sought to acclimatise these young animals in dangerous zones. Unfortunately, it is the very young calf which is particularly refractory, and it has need of its mother's milk for its development. By sending away both, the difficulty is not met.

On the other hand, a man does not easily reconcile himself to waiting eighteen months or two years for the complete development of a brood animal before deriving any profit from it by the improvement of his herd.

One means much extolled, and which might be of real service, consists in placing young ticks on sensitive animals, and thus conferring immunity on them.

The breeding of ticks is very simple, so that the necessary number for this style of vaccination could easily be obtained. I have made several experiments to demonstrate the efficacy of this proceeding. Animals which had nourished a certain number of ticks have not had the disease, and subsequent inoculation has shown that they were quite immune. In the month of April of this year (1900) I sent into the infested districts a cross-bred Durham cow and her calf eight months old on which I had raised five generations of ticks without a single mischance. These two animals have always remained in perfect health from the very commencement of my experiments, whilst a great number of beasts taken to the same locality died of malaria.

Still, the artificial infection by ticks presents inconveniences which render it difficult of application. Not being able to control their virulence, one would sometimes induce the disease and even kill the animals, whilst in other cases the animals would not be sufficiently treated to render them immune. In fact, we can pile on the ticks at pleasure, but we cannot take them off as easily, and they might then create new homes of infection. On the other hand, one may avoid the ticks in an open affected district by sowing lucerne.

This very advantageous practice labours also under a serious disadvantage which I have pointed out, and that is the almost certain infection of the cattle raised in these lucerne fields, the moment they leave them, without ever having previously been subjected to the influence of ticks. I would strongly advise owners of lucerne fields to reserve a small portion of their holding for native grasses, so as to allow the young animals to find ticks and subsequent immunity.

All the prophylactic measures which I have enumerated present, then, some serious inconveniences. Now, let us see if we should not have a better chance of succeeding by putting the ticks on one side and attacking the *Piroplasma* directly.

2.—MEASURES APPLICABLE AGAINST THE *PIROPLASMA BIGEMINUM*.—IMMUNITY.—VACCINATION.

First, Smith and Kilborne, in the United States, then Frank Tidwell, in Australia, R. Koch, in Eastern German South Africa, and, lastly, Nicolle and Adil-Bey, at Constantinople, have described the particular form of resistance that animals attacked for the first time by the disease oppose to a renewed infection.

But what is the importance of this immunity? Is it sufficiently complete and sufficiently lasting to induce one to produce it artificially by the injection of some vaccine? When we read what has been accomplished in the United States and in Australia, we must be convinced that a first attack confers a certain immunity. Still, the percentage of animals which have had a second attack is rather high.

R. Koch is very positive, but his experiments have been too restricted in number to carry entire conviction; besides, one of his animals died on a trial inoculation.

Nicolle and Adil-Bey, whilst admitting the indefinite immunity of indigenous animals to the malarial virus, have not had the opportunity of experimenting on exported cattle, *i.e.*, on the most sensitive. We shall see that they pin their faith more to a power of endurance than to a true immunity.

Since the most perfect possible knowledge of immunity should be the touchstone of a preventive inoculation, I had to obtain light on its existence, its power, its duration, and its mechanism. I have made, with this object, nearly 200 experiments, of which I am about to give the results, and especially my conclusions.

(*a.*)—*Natural immunity of animals in the infected zones.*

There is a considerable difference in the degree of immunity, according to whether the cattle come from zones slightly infested, very much infested, or free from infestation.

Thus, in the province of Santa Fé, stretching extensively from north to south, we see, with very rare exceptions, animals born in the northern parts resisting the most virulent inoculations without appearing to suffer the least in the world. Animals of the extreme south, on the contrary, are certain to take the disease; and, lastly, in the intermediate zones we find a more considerable number of animals which, whilst bearing the infection, have fever and hæmatozoa in the blood for many days in succession. Natural immunity then, acquired, be it in youth by the punctures of the ticks, or the result of a first infection, or perhaps due somewhat to heredity,* appears to us in various degrees. Sometimes the inoculations of very virulent products do not succeed in overcoming it; sometimes, on the contrary, one succeeds in inducing a mild affection.

(*b.*)—*Immunity of animals experimentally inoculated.*

All my experiments have been made on animals sensitive to malaria, and coming from immune districts. The virulent form, *i.e.*, that which produces hæmoglobinurea, is followed by an immunity such that in no case, whatever may be the quantity, the quality of the virus and the means of inoculation, or the virulent injection, was the experiment followed by any result, nor did it cause the *Piroplasma* to re-appear in the blood.

* I have had occasion to inoculate a calf eight months old, born of a mother which had the virulent disease and reared at my laboratory, and consequently beyond all cause of infection. It took the disease consequent upon an injection of 10 c.c. of blood into the jugular, and was cured after eight days. This experiment seems to prove the insufficiency of the hereditary immunity theory.

When the experimental infection has produced the disease in the mild form, without hæmoglobinurea, *but infecting some of the red corpuscles*, the consequent immunity is very strong if the trial inoculation has not been delayed too long. Thus, the injection of 10 c.c. of virulent blood into the jugular of a bullock attacked two or three weeks previously by the mild disease, remains quite negative; hæmatozoa are not again found in the blood.

Occasionally, however, after three or four months these animals again have a slight sensibility to inoculation which is shown by a passing fever and the appearance of the *Piroplasma* in the blood.

The virulent form of bovine malaria furnishes an absolute immunity much more durable, since I have found it impossible to re-infect, even slightly, animals which had been sick eight months before.

The bovine malaria, then, confers immunity as the result of a first attack. This attack may have been light or severe, yet the trial inoculation, be it as severe as one might wish, has no effect, and contrarily to what has been advanced by Messrs. Nicolle and Adil-Bey, there is not, *from the mere fact of a fresh inoculation*, any re-appearance of the *Piroplasma* in the blood. If, immediately after a cure of the disease, whatever may have been its form, the immunity is identical, we see that it diminishes with time, slower when it is a question of the virulent form; at the same time, the animal may benefit for a long time from the immunity resulting from a mild attack.

Immunity seems to keep step with infection. A strong and durable immunity will correspond with a virulent attack; a fleeting immunity, with a mild attack. It is between these two extremes that we find the medium.

Is immunity, acquired naturally or artificially, available against infection by tick?

Observation has often shown me, in an indisputable manner, the resistance of cattle naturally infected, when they are subjected to another attack of the ticks. I have mentioned an epidemic in which, of 1,000 head, 650 cattle perished from malaria; now, about fifty very fine cows—cross-bred Durhams—coming from a neighbouring estate, had accidentally got mixed up with the diseased beasts; their perfect state of health during the whole course of the epidemic was in singular contrast to the miserable appearance of the contaminated animals. These cows, taken off the property in the preceding year, had paid their tribute to the malaria (400 dead out of 600), so that they were spared in spite of the numerous ticks which they harboured.

When immunity has been acquired by means of sub-cutaneous or intravenous injection of virulent products, the resistance to infection by ticks is evident.

Animals showing severe disease have completely resisted infection by ticks, whilst under the same conditions, the controls contracted the disease.

If the original infection has been mild, contamination by ticks was all the more easy, as the second trial was undertaken some time after the first attack.

According to the opinion I expressed as to the particular *rôle* of the ticks in the transmission of malaria, it appears that re-infection by these parasites is easier than by artificial inoculation, since they would inject, at the same time as the malarial virus, a substance eminently adapted to the development of hæmatozoa, and, as a fact, amongst many experiments in this direction, some have fully confirmed this view. Ticks overcome immunity better than experimental inoculations; at the same time, the animal which has been rendered immune against the latter, and then has been infected by ticks, still manifests its immunity by taking, at the worst, only the mild form of the malaria.

My own researches prove then, in the most categoric manner, that a first attack confers an immunity all the more durable against artificial infection; that this original attack had been more severe. According to my researches, immunity consequent on a severe attack lasts, at the very least, for one year.

Since the power of resistance resulting from a light attack is considerable during the first few weeks, it is clear that the animals thus rendered immune should be placed as soon as possible in the infested zones; by so doing, not

only will they be able to resist natural contamination, but their immunity will be found to gain strength. This authentication is all the more fortunate, and ought not to be neglected, if successful preventive vaccinations have been made.

Is it immunity or only tolerance?

According to Nicolle and Adil-Bey, a first inoculation confers tolerance rather than immunity.

These authors base their opinion on the persistence of the *Piroplasma* in the organism, and the constant appearance of the latter, at least amongst adult beasts, after a fresh virulent inoculation.

Smith and Kilborne in the United States, Pound in Australia, have declared the persistence of the hæmatozoa of bovine malaria in the organism. On the other hand, many observers have described the frequency of the *Piroplasma* in the blood of great ruminants attacked by bovine plague, and quite recently Nicolle and Adil-Bey have shown, by conclusive evidence, the singularly favourable influence of the microbe of bovine plague on the *Piroplasma*. Here is one of their experiments:—

A Crimean animal, aged 1½ years, was inoculated on 27th March, 1898, in the veins, with $\frac{1}{10}$ c.c. of malarial blood. It exhibited fever and hæmatozoa. It was again inoculated, sub-cutaneously, on 30th June, 1898, with half a cubic centimetre of *pure plague virus*. It contracted bovine plague, but showed at the same time hæmatozoa both during life and after death. In the interval between the two injections the animal's health was perfectly good.

This phenomenon of the persistence of hæmatozoa in the organism was too important for me to neglect its study in my turn.

I confined myself at first to examining for some length of time the blood, which was the more easy for me to do as I had already undertaken the task of daily counting the red corpuscles.

Under these conditions I examined every day, and for several months, the blood of animals affected with bovine malaria, so that I have been able to prove that in the virulent form, the rapid disappearance of hæmatozoa towards the eighth or tenth day is only apparent, for, at long intervals, only very few infected blood corpuscles are seen.

Some examples:—

a. A bull inoculated on the 29th April, 1899, began to show a few hæmatozoa on 7th May. During the following days, until 15th May exclusive, they were very easily found, then they seemed to disappear, when, on the 24th May, I again found an infected corpuscle. On the following days the most minute examination failed to show any, except that on 10th June I found a corpuscle containing a hæmatozoic type. The examinations, although continued to the 1st July, disclosed nothing in the corpuscles. On the 15th May this animal had entered the stage of thorough convalescence.

b. On the 21st June, 1899, a bullock received a sub-cutaneous injection of 10 c.c. of virulent blood. From the 22nd to the 2nd July I found hæmatozoa present. Again, on the 26th July and 12th August, I met with an infected corpuscle. I had found nothing during the interval, and my examination lasted till 1st September.

c. I may also cite the case of the beast which relapsed, in which I found hæmatozoa from the first day of inoculation to the 10th exclusive. I found them again on the 28th June, and on the 7th and 30th July. In the interval, and up to 4th August, I found no micro-organism in the blood.

Many a time, in examining the blood of animals which had been diseased, I have found a corpuscle infected by the *Piroplasma* type three months and even four after inoculation. And further, the intra-venous injection of a healthy animal of 20 c.c. of blood taken from an animal cured several months previously, has occasionally caused the malaria. These facts prove that after the *Piroplasma bigeminum* has shown itself in greater or less abundance during ten days, it seems to disappear, but that in reality it re-appears at rare intervals for a long period.

Smith and Kilborne have also proved the re-appearance of the *Piroplasma* without fresh inoculation; they even go so far as to affirm that about a month after the sickness, there is always a relapse, a statement which is a little exaggerated.

As I have said further back, the experiments of Nicolle and Adil-Bey furnish a fresh proof of the persistence of the *Piroplasma* in the organism; they show, moreover, that the action of the microbe of bovine plague is particularly favourable to the *Piroplasma.*

There is no cattle plague in the Argentine; nevertheless, I have tried to find out if there might not be other diseases to take its place. I have tried the bacteria of anthrax, some Pasteurella,* and hog-cholera.

In the trial by anthrax I have never succeeded in inducing the re-appearance of the *Piroplasma* in the organisms of animals which had already suffered from malaria, however many had succumbed to the effects of injection of anthrax. With the *Pasteurella*, and notably with the cocco-bacillus of bovine pasteurellosis, I have succeeded, but it was with the greatest difficulty, and in the long run, only by making the animals completely cachectic.

Example: Early in April, 1899, the malaria was raging in a herd of cattle in the province of Santa Fé. I asked for several convalescent beasts, and these arrived at my laboratory very much emaciated on the 25th of the same month. I had them isolated in stalls, as they were harbourers of ticks.

On July 3 these animals were in better condition; one of them received a subcutaneous injection of 3 c.c. of a slightly virulent culture of bovine pasteurellose; temperature, 38°5 C. I took the temperature every day, and drew a few drops of blood from the jugular for the purpose of microscopic examination. The inoculations with cultures of bovine pasteurellose were as under:—

July 6.—90 c.c.	of culture	(in peptone broth),	sub-cutaneous.
" 10.—70 c.c.	"	(" ")	"
" 12.—4 c.c.	"	(peritonæum of guinea-pig),	sub-cutaneous.
" 13.—10 c.c.	"	(" ")	"
" 16.—20 c.c.	"	(" ")	"
" 20.—15 c.c.	"	(" ")	"

The animal had abscesses at the points of injection; it became emaciated, was anæmic, and had the fever after each fresh inoculation.

July 24.—20 c.c. of culture in broth in the jugular.

July 25.—Temperature, 41°8 C.

July 26.—Temperature, 41°5 C.

July 27.—Temperature, 41°3 C.

July 28.—Temperature, 41° C.

July 29.—Temperature, 40°8 C.

July 30.—Temperature, 38°8 C. The animal was very ill, anæmic and emaciated, but at no time from the beginning of the experiment were any hæmatozoa present in the corpuscles.

From 1st to 9th August, it became daily weaker; still, it fed a little.

On 10th August I found, in a preparation, four or five red corpuscles with hæmatozoic types. The temperature was 39° C.

On the 11th I found four infected corpuscles. The animal was now unable to rise; it had an arthritis in each hock, determined by injections of pasteurellose; temperature, 39°2 C.

On the 12th I saw two corpuscles containing *Piroplasma;* temperature, 39°7 C.

August 13th.—Temperature, 39° C. Again an infected corpuscle.

August 14th.—Temperature, 39°1. Nothing to be seen in the corpuscles; the animal was very sick, ate almost nothing, and was reduced to the condition of a skeleton.

August 15th.—Temperature, 37°9 C. Nothing in the corpuscles.

August 16th.—Temperature, 37°5 C. Nothing in the corpuscles. The animal appeared to be at the point of death.

August 17th.—Temperature, 35°5 C. It died in the evening. At the *post-mortem*, apart from the anæmia, I found no lesion whatever which denoted malaria, and nowhere did I find the *Piroplasma.*

The appearance of hæmatozoa was certainly favoured by the injections, for ordinarily, when they are observed to re-appear spontaneously, it is only to disappear on the following day; in the example given here, on the contrary, there was a true mild attack.

I have also made experiments with hog-cholera, but succeeded no better—a fact which proves the specially favourable action of the micro-organism of bovine plague for the *Piroplasma bigeminum.*

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* Of the whole group of hæmorrhagic septicemia.

From the preceding remarks we may conclude that it is not sufficient to find, after re-inoculation, an infected corpuscle in the blood of an animal which has recovered from malaria, to incriminate this second inoculation, since without the latter, some infected corpuscles might have been seen. When there is a true re-infection, *Piroplasma* are found in the corpuscles for several days in succession.

As I have stated, this re-infection should always exist in adult cases, according to Nicolle and Adil-Bey. Now, my experiments prove the absolute contrary.

The intra-venous or sub-cutaneous injection of a strong dose of malarial blood has absolutely no effect on animals which have lately resisted a first attack, especially if it has been a severe one.

Here is one example from amongst many others :—

On the 14th July, a cross-bred Durham bullock received a sub-cutaneous injection of 10 c.c. of virulent blood. For a few days thereafter it took the disease in a virulent form, with hæmoglobinurea for three days.

On the 23rd this animal was convalescent. On the 31st it was fairly well, had a good appetite, but was very anæmic and emaciated ; since the 23rd, no more hæmatozoa were found in the blood corpuscles. I injected into the jugular 10 c.c. of blood very rich in virulent hæmatozoa, which I found in a control. The blood was examined every day. On 9th August, I found a hæmatozoa ; on the 14th I saw two corpuscles infected ; on the 18th, one. During the interval, the animal disclosed no hæmatozoa in the corpuscles until 1st September, when I ceased to examine the blood daily.

The second inoculation did not at all interfere with the convalescence of the animal, and I found no more hæmatozoa in its blood than in that of those which had not been inoculated a second time.

Better still, if the second inoculation is effected at the precise moment when the hæmatozoa begin to disappear, it will produce no effect. I detail in this place a convincing experiment :—

On July 31st, 1899, a bullock was inoculated sub-cutaneously with 10 c.c. of virulent blood. Temperature, 38°4 C.

August 1.—Temp., 38°7 C.
,, 2.— ,, 39°9 C. There were a few hæmatozoa in the corpuscles.

August 3.— ,, 41° C. Many hæmatozoa ; in the evening the urine was faintly tinged with red.

August 4.—Temp., 41°4 C. Many *Piroplasma ;* urine very red. There were only 2,000,000 red corpuscles per m.m.c.

August 5.—Temp., 40°7 C. Urine, very red ; animal lying down, very ill ; hæmatozoa less numerous.

August 6.—Temp., 37°9 C. Animal improved ; urine no longer red ; began to feed ; hæmatozoa scarce.

In the evening, the subject received a sub-cutaneous injection of 20 c.c. of virulent blood, containing a large number of hæmatozoa.

August 7.—Temp., 37°8 C. Continued improvement ; the appetite returned a little ; the urine, which was of normal colour, contained albumen. The hæmatozoa were exceedingly rare in the corpuscles.

August 8.—Temp., 37°5 C. No hæmatozoa.
,, 9.— ,, 38°6 C. No hæmatozoa in the blood, but some giant cells, many of which are multi-nucleated.

August 10.—Temp., 38°3 C. No hæmatozoa.
,, 11.— ,, 38°7 C. Nothing in the corpuscles.
,, 12.— ,, 38°9 C. No *Piroplasma*, but many giant multi-nucleated cells.
August 13.—Temp., 38°8 C. Only in one corpuscle did I see a hæmatozoic type.
,, 14.— ,, 38°9 C. Nothing in the corpuscles.
,, 15.— ,, 38°8 C. One corpuscle contained a hæmatozoa.
,, 16.— ,, 38°6 C. No hæmatozoa ; multi-nucleated cells rare.
,, 17.— ,, 38°9 C. Nothing in the corpuscles.
,, 18.— ,, 38°2 C. No *Piroplasma.*
,, 19.— ,, 39°2 C. Nothing in the corpuscles.
,, 20.— ,, 38°3 C. Micro-organisms in the corpuscles still absent.
,, 21.— ,, 38°6 C. One corpuscle contained two types of hæmatozoa.
,, 23.— ,, 39° C. Nothing in the corpuscles.

Up to the 6th September the temperature was normal, and I met with no *Piroplasma*. The corpuscular reparation became normal.

It will be seen that there is no difference between this animal, which was inoculated twice in succession, and those which were only inoculated once.

The hæmatozoa which were injected on August 6 evidently found the organism inimical to their natural development; it was a case of true immunity, not one of tolerance.

There can be no doubt that after an inoculation with malarial virus, Nicolle and Adil-Bey saw the hæmatozoa re-appear in the blood of cattle which they considered refractory. But this phenomenon is probably due to these learned experimenters operating on animals which an insufficient or too ancient immunity did not protect from a mild attack.

I have correctly shown in the course of this study, that after some months cattle affected with benign malaria find their sensitiveness returning by degrees in presence of the *Piroplasma.*

I will now explain how I understand immunity in bovine malaria.

SUMMARY OF THE MECHANISM OF IMMUNITY IN BOVINE MALARIA.

LATENT PARASITISM AND CONSTANT IMMUNITY.

Clinical and experimental science demonstrate in an irrefutable manner that a first attack of bovine malaria confers immunity.

This immunity is correlative with the intensity of the infection.

It will be all the more lasting the more severe has been the attack.

So far, its duration has not been well determined. In order to determine it in as exact a manner as possible, I have made some experiments in re-inoculation of cattle which have been cured of the virulent form for two, four, six, and eight months, and which had not undergone, in all that time, any fresh inoculation, either natural or experimental.

All these animals resisted the trial inoculation without experiencing the least discomfort.

Although my experiments have not been carried out on animals which had recovered longer than eight months, it is extremely probable that immunity acquired by a virulent attack, either experimental or natural, lasts much longer.*

Is it possible, with the knowledge which we possess to-day of the biology of the *Piroplasma bigeminum*, to penetrate further into the study of this refractory condition, to understand better the mechanism of this resistance offered by the organism to a fresh attack? There appears to me to exist in the solution of this problem a question of doctrine of considerable importance.

The discovery of the complete cycle of evolution of the *Piroplasma bigeminum* will help us to interpret the mechanism of immunity in bovine malaria. To thoroughly understand it, we must first study it amongst animals which have been diseased by experimental means. The refractory state then presents itself in all its purity, completely disengaged from outside influences.

The experimental researches to which I have devoted myself, justify me in affirming that the *Piroplasma bigeminum* does not act in the organism of cattle by its sole presence in the blood corpuscles. It has evidently also the property of secreting a poison more or less analogous to the toxin of microbes by the help of which poison it causes, in some manner, the substance of the blood to ferment in order to assimilate those parts useful for its development.

The chemical analysis of blood, without indicating to us the nature of this poison, has, at least, shown us some of its effects, such as a greater solubility of the albumen and of the hæmoglobin, and destruction of a large portion of the latter.

In diminishing the corpuscular resistance, this hæmatozoic poison favours the development of the *Piroplasma* in the interior of the blood corpuscles. The infection continues its ravages so long as there are corpuscles sensitive to the action of the poison, and in condition, consequently, to be invaded by the micro-organism.

* It is my intention to complete these experiments on animals which recovered a year or more ago.

The organism, however, exerts all its powers and means of defence to oppose the advance of the invading hæmatozoa.

All the red corpuscles are not equally sensitive to the action of the hæmatozoic poison. At first a few, afterwards a great number, are slowly impregnated by it and gradually accustom themselves to it.

Becoming so accustomed, their power of resistance increases, and they become unadapted to harbour the spore of the parasite destined to develop into the piriform state.

As the number of these resistant corpuscles increases, the disease declines; the organism triumphs over the micro-organism, and the cure begins.

The action of the toluylene-diamine on the blood corpuscles furnishes a very instructive example of this conformability of the red corpuscles.

Injected sub-cutaneously, the toluylene-diamine rapidly changes the red corpuscles, and may determine the hæmoglobinemia or even the hæmoglobinurea. but it produces scarcely any effect when an animal has been accustomed to doses of this poison—weak at first, and then gradually increasing.*

Henceforth, as they can only find corpuscles accustomed to the poison, the hæmatozoa cease to multiply in the piriform character. The cycle of evolution stops short at the stage of sporulation.

But it must not be concluded that, because the parasite is no longer seen in its characteristic pear shape, it has been completely eliminated.

In this lies the main point. The specific parasite of bovine malaria, the *Piroplasma bigeminum* does not entirely disappear from the organism. *It remains in the form of a spore*, changing, slowly perhaps, into the round form to again become the spore.

We have seen the spores developing into the round form in the changed blood of diseased animals, placed in the warm chamber. It is not at all impossible that the same thing may take place in the organism under certain favourable conditions. It is these same spores which, circulating in the organism of animals long since recovered, may be taken in by the ticks at the same time as the blood, and be afterwards transmitted to healthy animals. A long time after recovery, at long intervals, and without the animal undergoing further inoculations, natural or experimental, the parasite re-appears in the characteristic endo-globular pear-shape.

The supposition that immunity is not antagonistic to persistence in the organism of the specific microbe in the latent state.

We find in bovine malaria a striking proof of this.

A first attack confers lasting durable immunity. Eight months after recovery, injections of enormous doses of malarial virus have no effect.

And more than this: This latent parasitism, which creates immunity, will also contribute to ensure its long duration.

As a matter of fact, the poison secreted by the parasite during the whole course of the disease, is not quickly eliminated.

So long as it remains in the blood, it produces, by mithridatisation, (applying an antidote) globular resistance and the refractory state towards the *Piroplasma*.

But there comes a time when it is completely eliminated, or is merely in insufficient quantity in the tissues. Then, some fresh red corpuscles which have not been accustomed to the poison become infected by the spores. It is at this moment that the endo-globular *Piroplasma* once more makes its appearance.

By means of this fresh infection, almost always mild in form, the organism renews its immunity. *So that in bovine malaria, the refractory state is, in reality, the consequence of successive immunities. Its persistence is thus explained.*

The experiment proves that a very small number of infected corpuscles is sufficient to enable the organism to recover immunity. It is precisely this

* See the very interesting thesis of Dr. A. Vast; Paris, 1899.

small number of infected corpuscles, the absence of general phenomena and acquired immunity which presage a possible extra-corpuscular evolution of the *Piroplasma.*

This last point appears new to me, and to be also of the greatest importance.

Since immunity can renew itself as we have just seen, its duration should therefore be unlimited. Yet experiment proves the contrary to be the case. Whatever may be the importance of the latent parasitism, the organism constantly seeks to get rid of it in the same way as it tries to avoid the retention of the poisons.

Hence it is evident that this affranchisement will be all the more easy and speedy according as the microbian or toxic retention is of least importance.

If the natural immunity observed in permanently affected centres, and which begins with the calf, appears illimitable, it is because this immunity is incessantly renewed by the punctures of the ticks.

The first inoculation, or even the several primary inoculations, are too mild to leave in the organism a sufficient quantity of spores capable of preserving immunity for a length of time. The proof of this lies in the fact that young cattle born in the infected districts, but withdrawn after two or three months to be raised in the lucerne fields, protected from inoculation, contract bovine malaria when they are taken to contaminated places.

In the same way, the receptivity of cattle which would only have had slight attacks and would remain some time without receiving any more, would reappear, especially if they were suddenly exposed to a severe inoculation by ticks.*

Under natural conditions we see, from time to time, epidemics breaking out in infected zones amongst native animals. These epidemics arise perhaps from no other cause.

To sum up, the long duration of the refractory state in bovine malaria is the consequence of successive immunities determined by repeated infections checked or abortive, either endogenous (latent parasitism) or exogenous (punctures frequently renewed by ticks). I do not think I am too bold in thinking that the facts revealed by the study of the refractory state in bovine malaria will throw light on many hitherto obscure points concerning immunity in certain parasitical or microbian diseases.

Although the retention of microbes or poisons in the organism is one of the most variable phenomena in its duration and in its effects, according to the nature itself of parasites and poisons, it must be admitted that this retention may prove to be an important factor in the production and in the persistence of immunity.

PREVENTIVE INOCULATIONS.

Since a first attack, even a light one, confers immunity, it is natural to seek to artificially produce this immunity by means of preventive inoculation.

Nicolle and Adil-Bey had already pointed out, that the serum of animals which had recovered and of hyper-vaccinated animals, is neither curative nor preventive.

It has, however, appeared to me that in inoculating a healthy animal subcutaneously with 100 to 200 c.c. of the *hæmo-globinemic serum* of a diseased beast, and in repeating this inoculation for two or three days in succession, I have obtained a very slight resistance compared with that of the controls, but so feeble at times that I cannot affirm the immunising property of this serum.†

* I again refer, *en passant*, to the importance of the quantity and quality of the ticks from the natural infection point of view. Numerous experiments made with ixodes of different productions prove this view.

† The serum was kept forty-eight hours in the warm chamber to make sure of its inocuousness. It will be remembered that after forty-eight hours in the warm chamber, blood loses all virulence. Perhaps the hæmo-globinemic serum is more or less rich in hæmatozoic poison, and contains at times a rather large quantity of it, so as to give the inoculated animals a slight resistant power.

In Texas and in Australia numerous trials have been made of vaccination by the injection of the blood of diseased animals or of those lately recovered. I have also tried this process, and have proved it to be impracticable. On the one hand, it is not known whether parasites are injected capable of evolution, and as a consequence able to confer immunity; on the other, one may superinduce the disease or even kill the animal. I have had 50 per cent. of deaths in this way due to preventive injections.

I have sought to attenuate the virulence of the *Piroplasma bigeminum*, but the results obtained are, up to the present, not perfect. At the same time I am convinced that one may succeed in obtaining a virus which will transmit the mild form of bovine malaria by inoculation without danger. For my part, I am actively engaged in this work. Thanks to M. Uriburu, a very progressive Argentine breeder, I was enabled lately to make an experiment on four bulls, which he had obligingly placed at my disposal. From the results obtained I hope to derive some valuable indications of the solution of the problem. I only cite the anthrax vaccine, so much extolled as a protection against the bovine malaria, to state that it is absolutely inefficacious. In all my experiments, the animals vaccinated as a protection against anthrax contracted the disease as well as the controls.

CONCLUSIONS.

My intention in this work has been to repeat the study of bovine malaria.

Amongst other points in the conclusions of Smith and Kilborne, I confirm—

1. The specificness of the *Piroplasma bigeminum.*
2. The alteration of the red corpuscles as the principal cause of the symptoms and lesions observed.
3. The inoculability of the disease to cattle by sub-cutaneous or intra-venous injections of the blood, viscera and tissues of the blood corpuscles.
4. The transmission of the disease by ticks.
5. The danger of sending cattle from immune districts to infected districts.
6. The virulence of the blood of healthy animals bred in infected centres and that of the ticks which they harbour.
7. The sensitiveness of adult cattle and the almost indifference of very young cattle to the *Piroplasma.*
8. The non-inoculability of bovine malaria in the case of rabbits, guinea-pigs, sheep, and pigeons.
9. With Nicolle and Adil-Bey. The permanence of the *Piroplasma* in the tissues of cattle infected for a long time.

I would observe further:

A. That the consecutive immunity by a first attack is more lasting than Smith and Kilborne have believed.

B. That the examination of the blood, although it is the most important item of the diagnosis *ante-mortem*, is occasionally at fault.

C. That there exists, in fact, an atypic form of the disease, in which the corpuscular loss is little accentuated, or very slow, and in which the corpuscles of the general circulation are not invaded by the *Piroplasma*, or are only so invaded at the approach of death.

D. That this form does not correspond to the mild disease; in the latter, indeed, the corpuscular infection and the destruction of the blood corpuscles begin from the commencement of the disease, but are of no great importance.

E. That the mild form is not caused by the punctiform hæmatozoa, as Smith and Kilborne thought, but by the *Piroplasma* type.

Lastly I add:

(*a.*) The history of the evolution of *Piroplasma bigeminum*, incomplete until now, the discovery of the spore, the exact form of the parasite.

(*b.*) The culture in a warm chamber of *Piroplasma bigeminum* in the round form.

(c.) A trial of the rational interpretation of the immunity and of the particular *rôle* of the tick.

(d.) The manner in which bovine malaria exists in the Argentine Republic.

(e.) The actual state of the prophylactic.

(f.) The absolute inefficacy of quinine or arsenical compounds as a preventive or curative means.

In all my researches I have been cordially assisted by the Argentine Breeders' Commission, which, while continuing its own work, neglected nothing to facilitate my task; by the Minister for Agriculture, represented by his Director, M. Tidblom; and by a large number of breeders, friends of progress.

I am pleased to publicly tender my sincere thanks to all these devoted gentlemen. I must make special mention of M. Domingo Lahargou, who prepared the photographs here given, and whose artistic and disinterested science triumphed over all difficulties. I trust he will accept my gratitude.

I must not forget my young assistant, M. Marcel Lignières, with whom I have shared fatigue, disappointment, and success. He has for this reason a right to a share in the results obtained.

Lastly, my thanks are due to the printer, Penser, for the minute care he has bestowed upon this work.

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I again have to express my indebtedness to Mr. W. C. Quinnell, M.R.C.V.S.L., of the Queensland Agricultural Department, for his valuable assistance in securing the correctness of the Anglicised technical terms in the above translation.—A.J.B.

* Date anticipated.

Agricultural Patents.

PATENTS ACCEPTED.

REGULATING INCUBATORS.—Class 35 (3 Figures)—5823: William McArthur Stewart, of Unwin's Bridge road, St. Peters, near Sydney, New South Wales, manufacturer. "Improvements relating to Levers for Incubator Lamps." Dated 24th December, 1900. (Drawings, 12s. 6d.; specification, 4s. 6d.) In incubators in which the wick-shield of the lamp is moved up and down by a thermostat lever; the wick-shield is at one end of an horizontal bar which is guided by a cylindrical balance weight sliding in a tube; the chain or link from the thermostat lever is attached above and in the vertical line of the centre of gravity of the balanced parts. (1 claim.)

General Notes.

A CURIOUS GREEK COIN.

A correspondent of the *Farmer and Stockbreeder*, London, sent to that journal the accompanying copy of a very curious Greek coin in his possession. We know that the raising of live stock occupied a large share of the attention of the most ancient nations. From the earliest Biblical narratives and from inscriptions and sculptures on the walls of temples and other public buildings, as well as from the monuments of nations once powerful, long since vanished from the face of the earth, we have proof of the important part played by agriculture and stock-breeding in ancient times.

One would scarcely have expected so refined and artistic a people as the Greeks to have issued a coin such as is here depicted, showing the effigy of a wretched razor-backed sow with a litter, three of which appear to have five legs. The coin is of silver, about the size of a florin, but much thicker and heavier. The coin may have been a prize medal for best sow and litter.

TO MEND CRACKS IN STOVES.

To mend cracks in stove and stove-pipes, make a paste of ashes and salt, with water, and apply. A harder and more durable cement is made of iron filings, sal ammoniac, and water.

ANALYSIS OF THE SWEET POTATO.

The analysis of the sweet potato (according to Dalgety's *Review*) is as follows:—100 lb. sweet potato contains 69·32 to 73·11 lb. water, 1·09 to 1·29 lb. ash, 1·38 to 2·47 protein or flesh-forming material, 0·86 to 1·23 lb. fibre, 29·73 to 28·46 lb. nitrogen free extract (starch, sugar, gum, &c.), and 0·43 to 0·85 lb. fat; a total of 27·46 lb. to 32·49 lb. dry matter. It thus contains more dry matter and more starchy and sugary food, but less nitrogenous material than the ordinary potato. As a comparison it may be stated that 100 lb. maize contains 89·1 dry matter, 10·5 protein, and 75 lb. nitrogen free extract, while 300 lb. sweet potatoes contain 86·7 dry matter, 4·5 lb. protein, and 75·3 lb. nitrogen free extract.

GROWING RADISHES BY ELECTRICITY.

It is no new idea that vegetables come to maturity sooner by the application of electricity than if left to their natural course.

A farmer in New Jersey has for some time been making use of the electric current from the wires of a trolly company to force his vegetables. It was discovered that the ingenious gardener had tapped one of the main feeders and utilised the current to stimulate the growth of certain crops on his farm. A perfect network of wire was discovered under a vegetable bed, 300 feet long by 200 feet wide, in which radishes were grown. These radishes are claimed to have matured in nineteen days, whereas radishes grown under ordinary circumstances required six weeks before reaching maturity.

NAILS IN PEACH TREES.

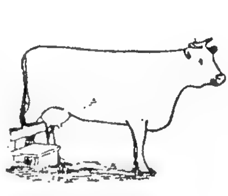
Many years ago, we were advised to drive copper nails into our orange trees as a preventive against the borer. We cannot to-day recall the result, but the idea was certainly based on a good supposition, which was that the copper imparted to the wood and sap a flavour distasteful to the borer. A correspondent of the *Florida Times, Union, and Citizen* says on this subject:—Borers are the worst enemy of the peach tree in Florida. I will tell your readers a sure way to keep them out. Clear away the dirt around the tree and take and drive a nail into the tree, end level with the ground, clear in full length. If it is small, use a lath nail; if larger, use a longer nail. You will never have any borers in that tree. I have tried it in my seedling peach trees—I never could make these new-fangled budded trees do well around my place.

POISONING CROWS.

In the Corowa district, New South Wales, the crows which are usually troublesome at lambing time have been destroyed successfully by means of the following poison:—Take 6 lb. of fat, melt it; place half a stick of phosphorus in a pickle bottle, and pour boiling water on it. Let the fat cool to the consistency of treacle or the point prior to settling; then pour the liquidised phosphorus into it, and stir well till it sets. Spread the poisonous fat on green sheepskins, also over dead sheep or lambs on the place the crows are known to feast. Great care should be taken that not more than half-a-stick of phosphorus is used to 6 lb. of fat, and that the lot is well stirred till cool, else the phosphorus will consolidate and ignite the lot.

KICKING COWS.

Most dairy farmers have experienced trouble with kicking cows. Here is a device worth trying, which is taken from *The Homestead*. The illustration requires no explanation.

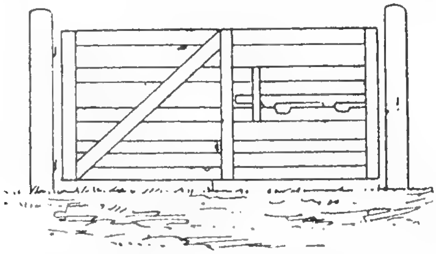


SUGAR CANE AND CANE SUGAR.

The consumption of sugar-cane is rapidly increasing, and it is a good thing for both producers and consumers, for it is a profitable crop and a wholesome food, as well as the delightful basis of every confection. The time-worn hypotheses of stingy parents that sugar deranges the stomach, rots the teeth, or any other bad effect upon the health or strength of the consumer, have been utterly disproven by known facts. On the contrary, the best medical authorities class sugar as a wholesome and easily digested aliment, containing in the best possible form the best elements required to develop physical energy and to counteract the waste of emaciating diseases. It has long been known that inhaling the steam from boiling cane juice has a wonderfully palliating effect in pulmonary diseases, and hundreds of sugar boilers by the open kettle processes are firm in the belief that it will actually cure consumption. It is certain, however, that working in a sugar house improves the condition and relieves much of the suffering of consumptive patients. Cane juice sucked from the chewed cane or drunk by dipperfuls from a juice tank is advised in fevers by the best physicians in the malarious cane-growing sections, and the writer has both witnessed and experienced its salutary effects, under the advice of the venerable Dr. F. M. Law, of Bryan, Texas, when he was serving as voluntary soldier, chaplain and physician to Greene's regiment, T. V. G., in 1863. The juice is diuretic, diaphoretic, refrigerant, nutritious, and refreshing. The robust health of both negroes and whites who work on sugar plantations and in sugar houses is proverbial, although the country is notoriously malarious. —*Texas Farm and Ranch.*

A NEW GATE-FASTENER.

In these columns (*Farmer and Stockbreeder*), from time to time, there have appeared gate-fasteners of many kinds, from the most primitive to the ingeniously scientific. In the accompanying illustration, which is self-explanatory, we give another, and it must be admitted that it is characterised by the greatest simplicity. The wooden bolt is easily attached to the gate-bars,



which are cut so as to correspond with the projections on the bolt when the gate is shut, and all that is necessary is to cut a slot in the post to admit the tongue of the bolt. When closed the gate cannot become unlatched of its own accord, nor can it be opened by live stock.

PROTECT THE BIRDS.

Shall we ever arrive at the point of protecting our insectivorous birds from the gun of the town sportsman (?), who sallies forth on holidays and Sundays and shoots down every little bird that comes within range of his gun? Over and over again letters and articles have appeared in the public Press, pointing out the senseless cruelty of this bird-shooting. Farmers and orchardists know very well that certain birds are the best friends they have, yet men and boys in the country districts go out shooting in their spare time and bring home a bag of poor little birds quite useless either for food or ornament.

Crows and hawks also are mercilessly shot down, yet both are of the greatest value to the farmer. Everyone should know the value of the ibis, the curlew, the owl, the night-jar, or morepork, and many other birds which work for the farmer and gardener whilst he is asleep.

According to a German investigator, Herr Rörig, we should look upon the carrion crow as, on the whole, a farmer's friend, and upon the rook as a distinct benefactor to agriculture. After examining the contents of the stomachs of 3,259 crows and 1,500 rooks, he calculates that the grain eaten by the former during the whole year would have a money value of about £900. He estimates that the same number of birds inflict an annual damage of about £1,450 by the destruction of young hares, partridges, &c. That is to say, each crow inflicts damage to the amount altogether of about 14s. annually. The service rendered to the farmer by the same birds consists in the destruction of mice and pernicious insects, especially canker-worms and wireworms. Herr Rörig estimates that in the process of development the wireworm will destroy ten plants, a canker-worm twenty, and that a field mouse, with its progeny, will destroy 1,000. He calculates that the 3,259 crows referred to would benefit agriculturists to the amount of about £2,500 per annum by devouring injurious insects, &c. According to these estimates, the value of the benefit effected by the carrion crow exceeds the value of the damage it causes by 11d. per bird per annum. With rooks the difference is greater, amounting to over 4s. per annum.

The punishment provided by the Native Birds Protection Act for offences against the laws under that Act is a fine not exceeding £5, or, in default of payment, imprisonment for a term not exceeding three months. For shooting birds with a swivel gun the penalty is—for the first offence £10, and for a second or any subsequent offence £20.

By clause 9 of the principal Act the person who lays the information is entitled to half the fine paid by the offender.

We advise our readers to study the following compilation from the proclamation of 8th February, 1899:—

Districts to which the Acts Apply.

District.	Close Season.
Burnett, West Moreton, Darling Downs, Wide Bay, East Moreton, Port Curtis	1st September in each year to the 31st March in the following year, inclusive, excepting as to quails, for which the Close Season is from 1st November in each year to the 31st May in the following year, inclusive.
Petty Sessions District of— Burke, Mackay, Cairns, Norman, Cardwell, Palmer, Cook, Somerset, Croydon, Townsville, Ingham	1st November in each year to the 30th April in the following year, inclusive.

(Compiled from the Proclamation of 8th February, 1899.)

List of Reserves within which the Destruction of Native Birds is Prohibited during the whole year.

Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area).

Parish of Gracemere, county of Livingstone.

Parish of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channel and the shores thereof).

Parish of Crow's Nest and Douglas, counties of Cavendish and Aubigny.

Parish of Emu Creek, county of Cavendish.

Parish of Douglas, county of Aubigny.

Parish of Nerang, county of Ward, Southport.

Parish of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas).

Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run).

Parish of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve).

Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve).

Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park).

Parish of Ossa, county of Carlisle, Seaforth.

Parish of Cressbrook, Bowman, and Neara, county of Canning.

(*See* Proclamation of 8th February, 1899.)

List of Native Birds Protected throughout the whole year.

Cassowaries	Honey Eaters	Moreporks or Owls
Cockatoos (black)	Ibis	Night-Jars
Cranes	Kestrels (Nankeen)	Owls
Cuckoos	Kingfishers (including Laughing Jackasses)	Parrots (Grass)
Curlews (land)	Kites	Pheasants
Dollar Birds	Larks	Robins
Doves	Magpies (Organ Bird)	Spoonbills
Dragoon Birds (Pittas)	Magpie Larks	Wagtails (Shepherd's Companions)
Emus	Martens	Wood-peckers
Finches	Minah Birds	Wrens
Herons		

(Compiled from the Proclamation of 8th February, 1899.)

List of Birds subject to operation of Acts (Protected during Close Season).

Bitterns	Hawks, Brown	Rails, Land (all species)
Bower Birds (all species)	Insectivorous Birds, All	Rails, Water
Bustards or Plain Turkeys	Lyre Birds	Regent Birds
Curlews	Megapodius (Tallegalla or Scrub Turkey)	Rifle Birds
Dottrells	Native Companions	Satin Birds
Ducks, Wild (of any species)	Pigeons, Wild (all species)	Swans, Black
Geese, Wild	Plovers (all species)	Waders, All
	Quails	

The reserves in the counties of Aubigny and Cavendish are for the protection during the whole year of the following:—Tallegallas, all Pigeons, Emus, Regent Birds, and Quails.

The Acts are in operation during the whole year in the Petty Sessions Districts of Cairns, Cardwell, Croydon, Ingham, and Mackay, as regards the following:—All Waders, all Insectivorous Birds, including Brown Hawks and Native Companions.

VEGETABLE SPONGES.

Luffa ægyptiaca, Mill. (*C. cylindrica*, M. Roem.), is the botanical name for one of the Curcubitaceæ which is often seen growing in our gardens as a curiosity. No one appears to be aware that it forms an important article of export from Japan to London, Havre, Hamburg, San Francisco, New York, Shanghai, and Hongkong, to which ports over a million of these vegetable sponges are annually exported. They grow as freely as their congeners the pumpkin, gourd, cucumber, &c. In Japan they are grown in large areas, climbing on trellis-work. Each plant bears four or five fruits, and an acre will produce some 24,000 sponges. They are harvested in September. In the State of Queensland they grow to perfection on almost any sort of soil, and with no care whatever. Mr. Ad. F. Moller, writing to the *Tropen Pflanzer*, recommends their being grown in the German colonies for export to Hamburg.

When young the Luffa is as good to eat as a young marrow, but as it grows it develops too much fibre to be eatable.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

MANURING SWEDES.

J. Edwards, Toowoomba—

Question.—What is the effect of manuring swedes?

Answer.—This is rather a singular question to come from a district so celebrated for the wonderful fertility of its soil. We have seen swedes of immense size grown both below and above the Range, without the aid of manure. However, as it may be of use to some farmers on poorer lands, we give you the following:—Suppose your land to be manured with 4 cwt. superphosphate and 2 cwt. kainit per acre, and put the yield of roots at 16 tons per acre. Now add ½ cwt. nitrate of soda, applied in the drills. The return should be over 18 tons, or, say, an increase due to nitrate of soda of 2 tons per acre.

A greater quantity of nitrate will result in a smaller increase. For instance, if 1 cwt. of nitrate of soda be applied, the increase will be about 1½ tons; whereas the application of 1½ cwt. only gives an increase of 13½ cwt.

Sulphate of ammonia applied in drills has little effect. As a top-dressing, in addition to ¾ cwt. applied in the drills, ½ cwt. (applied after the plants are thinned) will give an increase of about 17 cwt.

In both cases, the results depend greatly on the state of the weather.

MANURE FOR TOMATOES.

Market Gardener, Coorparoo.—Tomatoes will not stand heavy manuring after the fruit has set; it delays the development and ripening of the fruit. We have had practical evidence of this in our own garden. In the early stages of development, nitrogen, phosphoric acid, and potash may be liberally supplied with advantage. A good manure is made up as follows:—2 parts nitrate of soda, 2 parts bonemeal, 3 parts kainit, and 4 parts superphosphate (parts representing either ounces or pounds of each ingredient). Of this mixture, 1 oz. per square yard of soil may be applied weekly from the time the plants are established till the fruit has set. Superphosphate has been found to hasten the maturing of the fruit.

PASPALUM DILATATUM.

C.B., Taabinga, Nanango—

Question.—Can *Paspalum dilatatum* grown in a cultivated paddock be again eradicated, or does it partake of the nature of Johnston and and other noxious grasses?

Answer.—Mr. F. M. Bailey, Government Botanist, says that *Paspalum dilatatum* is a grass for which farmers cannot be too thankful. It is as easily eradicated as any ordinary grass, and does not in the least partake of the nature of Johnston or other noxious grasses. It makes a splendid turf, and when ploughed under forms an ideal bed for growing melons.

COMMERCIAL BUTTER.

H. H. Seaborn, Beaudesert—

Question.—Which cow would give the greatest amount of commercial butter fat from the following figures?

No. 1. 19·75 lb. milk. Test, 3·5.
No. 2. 18 „ „ 3·8.

Answer.—No. 1 would give the greater amount by as nearly as possible ¾ lb.

MANURE FOR THE COTTAGE GARDEN.

Cottage Gardener, Toowong.—The best manure for the home garden is undoubtedly well-rotted stable manure, but often the addition of some artificial manure is of great advantage to a vegetable or potato crop. Those who wish to use artificials, however, should be very careful about the quantity employed. One of our friends put enough artificial manure on half-a-perch of land to satisfy the requirements of 40 perches. Here is a very good manure for potatoes in a small garden:—

10 bushels wood ashes
10 ,, leaf mould
1 bushel soot
4 lb. sulphate of ammonia
6 ,, ,, ,, soda
10 ,, nitrate of soda
10 ,, sulphate of potash.

This is sufficient for 20 perches of land. An experiment made with this compost, on hungry shaley soil with a stiff clay subsoil, on a summer crop of potatoes resulted in a return at the rate of 4 tons 15 cwt. of saleable tubers per acre. Farm-yard manure alone produced a little over 2 tons. As an experiment, try the following plan:—Buy a couple of pounds of sulphate of potash, and the same quantity of sulphate of ammonia (wholesale price in Brisbane, 15s. per cwt.) Then prepare 4 square yards of your best garden soil, and apply a tablespoonful of the potash to each yard. Work it well into the soil some time before planting the potatoes or other experimental crops. When the plants are up, dissolve the sulphate of ammonia in water and apply with a watering can. With stable manure use about 3 oz. of superphosphate per square yard.

GOATS PER ACRE.

Goatherd, Helidon—

Question.—How many goats could I keep on an acre of hilly country like that of the Main Range between Helidon and Toowoomba?

Answer.—Much depends on the class of country. Some of the Range country is of excellent quality for stock, whilst much is absolutely valueless for any purpose but raising goats. We should say that from ten to twelve goats would be enough on very good country with plenty of shrubs and young undergrowth, and half the number on poorer country. If you really intend going in for the business, it will be well to bear in mind that if you run the animals on fenced land, that devoted to the goats should be subdivided into at least two—preferably four—paddocks, running them alternately in each.

THINNING PEACHES.

Amateur, Cleveland—

Question.—My peach-trees are loaded with blossom. Would it increase the size and quality of the fruit if the blossom were thinned? If so, when and how should the thinning be done?

Answer.—Never mind thinning the blossom: a late frost may do that for you; but if the whole crop sets, thin the fruit when formed. You should learn that part of the art of pruning in fact, the *main* part is to so arrange the growth of the tree as to secure a good quality of wood and not too much of it, and, following that, a proper distribution as well as quality of fruit. The great benefit of proper *summer pruning* is the production of fruit-wood with strong buds in place of thin, weak, and therefore inferior wood, and poor fruit as a result. Even with the above advantages, more or less thinning of the crop is sometimes necessary to keep up a really high standard of size and quality.

The Markets.

AVERAGE TOP PRICES FOR JULY.

Article.		JULY. Top Prices. £ s. d.
Bacon	lb.	0 0 8
Bran	ton	4 11 10½
Butter, First	lb.	0 1 0¼
Butter, Second	„	0 0 8⅝
Chaff, Mixed	ton	3 17 6
Chaff, Oaten	„	5 15 0
Chaff, Lucerne	„	3 15 0
Chaff, Wheaten	„	4 17 6
Cheese	lb.	0 0 7⅛
Flour	ton	7 10 0
Hay, Oaten	„	5 5 0
Hay, Lucerne	„	2 15 0
Honey	lb.	0 0 1¾
Rice, Japan (Bond)	ton	14 15 0
Maize	bush.	0 2 10
Oats	„	0 3 2
Pollard	ton	4 14 4½
Potatoes	„	7 15 0
Potatoes, Sweet	„	2 1 3
Pumpkins	„	1 16 3
Sugar, White	„	17 15 0
Sugar, Yellow	„	16 5 0
Sugar, Ration	„	12 7 6
Wheat	bush.	0 3 3
Onions	cwt.	0 14 3
Hams	lb.	0 0 9
Eggs	doz.	0 0 9⅞
Fowls	pair	0 3 10½
Geese	„	0 5 6
Ducks, English	„	0 4 5¾
Ducks, Muscovy	„	0 5 0¾
Turkeys, Hens	„	0 7 0
Turkeys, Gobblers	„	0 13 1½

ENOGGERA SALES.

Article.	JULY. Top Prices. £ s. d.
Bullocks	9 1 3
Cows	6 18 9
Wethers, Merino	0 15 10½
Ewes, Merino	0 12 9¾
Wethers, C.B.	0 14 7½
Ewes, C.B.	0 14 7
Lambs	0 13 6
Baconers	2 15 0
Porkers	1 19 7½
Slips	0 12 7½

Orchard Notes for September.

By ALBERT H. BENSON.

The planting and pruning of all deciduous trees should have been completed even in the coldest districts by the end of August, and during the present month the orchardist should disbud and thumb-prune the young trees as soon as they start out into growth. Judicious thumb-pruning is necessary in order to reduce the number of branches, only those buds being allowed to develop into branches that will be required to form the future head of the tree, all the rest being either removed, or, better still, pinched back and converted into spurs which will eventually bear fruit and which, meanwhile, will produce a tuft of leaves that will tend to strengthen the branch and to protect it from sunburn. Spraying should be continued during the month in the case of deciduous trees attacked by fungus diseases, such as the shot-hole fungus or rust of the apricot and the Windsor pear blight of pears, the material used being Bordeaux Mixture. Where leaf-eating insects of any kind are troublesome, a little Paris green—1 oz. to 10 gallons—should be added to the Bordeaux Mixture, the spraying material being then both an insecticide and fungicide, and two pests are destroyed by the one spraying. Vines that have not been treated for black spot, as described in the Orchard Notes for August, should be treated at once; and vine-planting should be done during the beginning of the month, though if the cuttings have been kept in a cold place planting can be continued all through the month. In planting grape-cuttings, see that the cutting is always planted firmly, and that the soil comes into direct touch with it all round, as, if not, it is very apt to dry out. Plant the cutting with the top eye just on a level with, or rather slightly below, the surface of the ground, not with 6 inches or more of the cutting sticking out of the ground, as the nearer to the ground the main stem of the vine starts the better the vine will be, and the easier will be its subsequent training.

Orange-trees will be in full blossom during the month, and in the earlier districts the young fruit will probably be ready to treat for Maori or rust towards the end of the month. Maori is caused by a very small mite, which begins its attack on the young fruit when it is about the size of a marble, though the injury it causes is seldom noticeable till the fruit begins to ripen. Spraying the trees with a mixture of sulphur and soft soap, or with a weak solution of sulphide of soda, or dusting the trees with fine sulphur, will destroy these mites. During the end of the month pineapple and banana suckers may be set out during favourable weather in the earlier districts, but it is not advisable to plant out too early, as they do not root readily till the soil is thoroughly well warmed. Orchards and vineyards should be kept well cultivated during the month, as if there is a dry spring the success of the crop will depend very much on the manner in which the orchard is kept, as the better the orchard is cultivated the longer it will retain the moisture required by the trees for the proper development of their fruit. Quickly-acting manures, such as sulphate of potash, sulphate of ammonia, and superphosphate, can be applied to fruit trees during the month if there is any suitable showery weather, but should not be applied during either a very dry or very wet spell. Fruit trees should be mulched, and when cow peas are required for mulching they can be planted towards the end of the month.

During the month a careful examination should be made of all fruit to see if any contains larvæ of fruit fly; and if such are found, they should be destroyed, as if extreme care is taken during this and the two following months to destroy the larvæ of all fruit flies, whenever and wherever found, this great curse of the fruitgrower would be greatly reduced, as it is on the careful destruction of the earlier broods of flies that the saving of the main crop of fruit will principally depend. Though the first damage caused by the flies is comparatively insignificant, they reproduce themselves so rapidly that a few mature insects in the beginning of the season become many thousands before it closes.

Farm and Garden Notes for October.

Farm.—Now 'is it spring time and the hot summer will soon be upon us, when scorching winds and possibly dry weather may sadden the heart of the farmer and market gardener. Yet showers may well be expected during the month of October, and much good work may be done with a fair prospect of a return for the labour in the field. The weeds will be troublesome, but do not let them get ahead of you. Keep the horse hoe and cultivator constantly going. Earth up the growing crops, and keep the ground loose among them. Plant sweet potatoes, yams, earth-nuts, arrowroot, turmeric, and ginger. Sow and plant out tobacco. Sow maize, sorghum, setaria, imphee, and kafir corn.

Kitchen Garden.—Now is the time to sow beans. French or kidney beans can be sown in all parts of the colony. Lima beans love the hot weather. Like the Cicadæ, who chirp the louder the hotter the sun, so the hotter the weather the better the Lima bean thrives. They make a first-class hot-weather vegetable. Sow the dwarf kinds in drills 3 feet apart, and 18 inches between the plants ; and the climbing sorts, 6 feet each way. Beet root is not too late. Sow cucumbers, marrows, squashes, and melons at once, if they are not already in the ground. If beetles attack them, spray with Paris green or London purple. Peas will do well in the cool districts. Set out egg plants in rows 4 feet apart. Plant out tomatoes 3½ feet each way, and train them to a single stem through wire-netting. Set out rosellas. Mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, and cabbage will prove satisfactory if, in well-worked ground, they are supplied with water, manure, and, if possible, shade. As in the field, keep the hoe and cultivator going. Remember to water early in the morning or late in the afternoon, and next day stir the soil well to prevent it from baking. During the hot months mulching will be found beneficial, as it keeps the soil moist.

Flower Garden.—Plant chrysanthemums, giving them plenty of water. If the garden has been well looked after during the past two months it will now show the result of the care bestowed upon it. Plant out palms and all kind, of tropical and semi-tropical plants. If the weather is hot after planting, water and shade the plants. Sow dianthus, snap-dragon, coleus, and plant tuberoses crinum, gladiolus, and other bulbs. Do as much of the work now as possible, and do it on dull, showery days. After all planting out is done the work will consist mainly in raking and stirring the beds, staking, shading, and watering. Roses should now be in full bloom. Keep them free from aphis, and cut off all spent blooms. The spent blooms should be always removed from all flowers. If you wish to save seed of any plant, do not wait for the very last blooms, but allow some of the best to go to seed.

Agriculture.

FIRST STEPS IN AGRICULTURE.

FIRST STAGE.

10th Lesson.

By A.J.B.

I will close this little book with an easy lesson on manuring the land. You have seen how lands may be exhausted by constant cropping, which removes quantities of the elements necessary for the growth of the crops and the production of their fruits. This exhaustion is overcome in several ways, and I have just mentioned some of them to prepare you for a fuller description of them in the next two primers. Thus, drainage, as you have seen, assists fertility by removing the cold stagnant water beneath the roots of the plants, by enabling the air to get into the soil, and by the roots finding their way deeper down, and so getting at the plant food which, before draining, was out of their reach.

Constant cultivation or stirring of the soil with plough, harrow, and hoe is also of great advantage to the crops. Poor land, badly cultivated, will never yield good crops, but even poor land, if thoroughly worked and constantly cultivated, may be made to produce very fair crops.

But in this place I want to tell you about manuring the land. There is a great variety of manures, but the good old-fashioned farmyard manure is what we will talk about now. We will suppose that you have a farm which, for a few years, has given heavy crops of wheat, potatoes, corn, sugar-cane, or arrowroot. By and by, you begin to notice that the plants do not look so large or so deep-green and healthy as formerly. The potato haulms have a yellowish look, the corn tassels long before it has reached its usual height, the wheat is straggly, the sugar-cane spindly, and the arrowroot bulbs are small and few.

You begin to see that something is wrong, and, as you have learnt how to tell the condition of your soil by the appearance of the crops, you come to the conclusion that it wants manuring. Now, some people would go to the merchant and buy a quantity of what are called "artificial" manures, because they have seen good crops got from poor land by their use. But this is unwise, unless you know exactly what plant food has been taken out of the soil. You may as well learn here that with the dark humus the soil contains POTASH, PHOSPHORIC ACID, NITROGEN (in the humus), *salt*, *iron*, *lime*, and other matters. If these have all been taken out of the soil, they can be replaced by the use of *natural manure*, such as *farmyard* manure, or by the use of *artificial* manures containing those elements. But how are you to know which of all these ingredients is wanting in the soil? You cannot tell by looking at it, and you may waste a great deal of money by buying a "fertiliser" which contains the very element the soil does not ask for. So you must go to someone who can tell you. That someone is a chemist. I do not mean the chemist who sells you medicine and pulls out your teeth, but what is called an *agricultural chemist.* His business is to find out all the things that go to make up every part of a plant. He can tell you exactly what makes the root, the stem, the leaves, the fruit, and what particular plant food each part requires. He makes what is called an "analysis" of the plant, or fruit, or grain. Just remember that word "analysis," because I shall have occasion to use it very often as you progress. I will, however, show you what is meant by it, but you need not trouble to learn the figures set down, as we have not gone far enough on our journey for you to be able to make any use of them.

Let us then find out what mineral elements go to build up the corn (maize) plant and its yellow grain. Now, the chemist begins by saying that the plant is made up of 1,000, 100, 50, or 25 parts of the various elements. Then he finds out how many parts of each of these are required to combine to produce the plant and its fruit, and the result is this :—

	Stalk.	Grain.
Ash	47·2 ...	12·3
Potash	16·6 ...	3·3
Soda	0 5 ...	0·2
Magnesia	2·6 ...	1·8
Lime	5·0 ...	0·3
Phosphoric acid ...	8·8 ...	5·5
Sulphuric acid ...	2·5 ...	0·1
Silica	17·9 ...	0·3
Sulphur	3·9 ...	1·2
	100·0 ...	25·0

Now, we will not, at this stage, say any more on the subject of analysis. I merely gave you this example to show you that it is possible to find out what a plant requires for its well-being, and in the same way the chemist can "analyse" the soil of your farm, and tell you exactly what is wanting in it. So, when you know that, you know what particular manure to put into it, and thus can save a great deal more money than it cost you to get the information from the chemist.

Now, let us get back to farmyard manure. Farmyard manure is what is called a "general" manure. It furnishes to the soil all the plant food required by crops. The difficulty, however, with it is that such a quantity of what may be called useless matter is carted on to a field with it. In 100 lb. of good, well-rotted farmyard manure there are 75 lb. of water, but when well-rotted it contains that very necessary element, nitrogen, and other elements all ready for the roots to seize and feed upon at once. Besides this, it contains many of them which are not ready for the plant, but which become "soluble" by degrees, and thus there is continuous food for the plants during the whole time of their growth.

Remember that all farmyard manures are not equally valuable. *The best of all is that from the horse stables*, and the reason is this: The food taken by the cow, or bullock, or sheep has to assist in producing milk or fat. The consequence is that some of the best portions of the food are retained by those animals, and the manure from them is therefore not so rich as that from the horse, which has not been bred for fattening or for producing milk. A good manure will "decompose"—that is to say, will *rot* quicker than a poor one. A manure that decomposes slowly is therefore not so *hot* as one that decomposes quickly. Horse manure decomposes rapidly, sheep manure slower but quicker than cattle manure, and the manure from the pigsty slower than all. Now, if you want to get good crops from applying farmyard manure, you must be very careful how you treat it.

You see careless farmers leaving the sweepings of the stable in a heap outside the building, or they allow their horses to wander about a yard covered with straw, and in wet weather the whole place is knee-deep in mud, and in dry weather the straw and manure are like so much chaff and dust. Do you know what is happening to the manure in both these cases?

In the first place, the liquid part of the manure drains out of the heap and runs away. Has it carried anything with it? You need only look at the trickling black stream to answer—Yes, something.

Well, what is that something? It is the very best part of the manure, which was soaked up in the stable, and is worth twice as much as the solid parts. Then, when the manure is allowed to dry up in the open air, it loses a very valuable element by what is called "evaporation." You have perhaps

put your nose to an open bottle of smelling salts. It made your eyes water, and, if you took a sudden, strong sniff at a freshly opened bottle, you were nearly choked. But you did not sniff up the solid salts—you only breathed the invisible gas from it. That strong smell comes from "ammonia," and it is that gas which gives the not very disagreeable and very healthy smell to stable manure.

Now, if the smelling bottle were left always open the strength of the salts would soon be all gone into the air. So it is with the ammonia in the stable manure. If it is left exposed to the air the gas escapes, and thus one of the most valuable elements goes away invisibly, and other equally valuable ones depart in the liquid stream. What is then left is of much smaller value than when it left the stable.

The business of the good farmer is to make these elements close prisoners, and keep them in the manure till he is ready to use it. How this is done will be the subject of a future lesson.

Always bear in mind that the more stable manure you save, the less you will have to buy. No farmer can afford to buy what he can produce himself. And do not forget that, although farmyard manure does not contain *all* the nutritious elements required by plants in the proper proportions, yet it is of very great value to the farmer, as it is generally the easiest manure to procure on a farm, and it has the very important quality of rendering light, porous soils more cohesive, thus enabling them to retain more moisture, whilst in the case of heavy, cold soils it acts beneficially by warming them, making them lighter, and thus more easy to cultivate and more suited to the production of good crops.

In a future lesson I will tell you something about "green-manuring."

Questions on Lesson 10.

1. How can you tell when the land requires manure?
2. What fertilising elements does the soil contain?
3. How may these elements be replaced if they have been removed by constant cropping?
4. What must a farmer do before he uses artificial manures on his exhausted land?
5. What is meant by an analysis of a soil?
6. What are the advantages of obtaining an analysis?
7. What is a "general" manure?
8. How much water is there in 100 lb. of good farmyard manure?
9. Name in their order of value the manures produced by horses, cattle, sheep, and pigs?
10. What is meant by "decomposing"?
11. Which is the better manure—one that decomposes slowly or one which decomposes quickly?
12. How does evaporation affect stable manure?
13. What effect has good stable manure on (1) light, porous soils, (2) heavy, stiff soils?

SECOND STAGE.

1st Lesson.

Every boy and girl knows that if we put a seed, say a bean or a cabbage seed, into the ground it will grow if it is regularly watered, and if it is kept free from weeds. But sometimes you will notice that, although the seed sprouts and shows green leaves above the ground, it soon dies off. Now there must be a reason for it dying off. Let us try and find out that reason. The little seed, hidden from the light and supplied with moisture, begins to swell, and at last bursts and sends out two little shoots. One of these is called generally the root. When you learn more about it you will find that the root has another name. The other shoot,

instead of going downwards into the ground, makes its way through the soil and appears above the ground.

Now you must try and understand that most plants derive their nourishment not only from the soil, but also from the air. The little rootlet that went down into the soil draws up water and other things which help to feed the shoot which is above the ground, whilst the upper shoot draws further nourishment from the air. How it does this you will learn in another lesson; meanwhile, what you have to remember is this: You have learnt so far that there are three parts to every plant—the seed, the rootlet that grows downwards, and the shoot that grows upwards. The flower and fruit we will leave to the next lesson. The part of the seed which effects these changes is called "the germ." Every living seed has a germ. The word "germ" is another word for life. If the seed is dead you will, of course, say it has no life; but if the seed is alive, it has within it something, and this something is called a germ. This is why we say a seed will germinate—that is, that it will grow. Having now learned, 1st, that the plants are produced from seed; 2nd, that a live seed produces the rootlet below the ground and the shoot above the ground; 3rd, that every living seed has a living germ, we can proceed to the next question, which is, "Why do some plants grow beautifully, and others die away before they produce fruit or flowers?" This question brings us to a further consideration of the soil.

You cannot now understand the difficulties connected with the soil, for the wisest men have spent their lives in trying to teach farmers and gardeners how to make the soil produce heavy crops. But this you can certainly understand. You know that you could not grow a crop of potatoes on an ironbark slab or on a smooth flat rock. Why? You will say, because there is no soil, and you would be quite right. But there are soils, as well as slabs and rocks, which will not produce any crops. Why is this?

Every plant requires something to make it grow. In this lesson I cannot tell you all that is required, because I should have to use a number of hard words which you could not recollect, and, even if you could remember, you would not understand them.

So I will explain the reason in such a way that you can quite understand it.

You know and say that you cannot grow a crop, say of potatoes, on an ironbark slab, and you add that the reason is that there is no soil. So as you know that soil is necessary to the plant, you must learn why it is necessary. Perhaps you think it is because the seed must be kept moist and in the dark. But if that were all, you might put your seeds on a wet sponge, and shut them up in a box. But if you did so you would get no plants. The seeds might swell and burst, and send out rootlets, but these would soon die for want of some other nourishment besides water. That nourishment the rootlet draws from the soil, and the shoot from the air; and farmers and gardeners call it *plant food*, as you learned in your first book.

Just as you and I require food to enable us to live and become healthy and strong, just as much do all plants require food to enable them to grow up and produce fruit and flowers. But you will say, How can a plant take in food? It has no mouth.

Now I will explain to you that every plant has not only a mouth but thousands of mouths, and every little mouth is busily engaged all day and all night in taking in food. How does it do this? I have already told you that the rootlet supplies nourishment to the green shoot above the ground. Well, this single rootlet is a sort of pipe which draws up moisture and sends it through every part of the plant. You have seen a plant on a hot day looking drooping and almost shrivelled. What happened when you watered that unhappy looking plant? In an hour or so you saw it holding up its head, and it changed from a thing like a limp rag into a healthy, vigorous looking plant. The reason was that the root sucked up the water you gave it, and that water soon passed up into every part above ground and gave it new life. If you were lost in the bush and had been a whole day or more without water, you would

find that you were no longer able to walk briskly. You would get weaker every hour, and unless you got a drink soon you would have to lie down, and perhaps die of thirst. The plant wants a drink just as much as you do, and, if it does not get it in time, like you, it will die. But you suddenly come upon a water-hole full of nice clear water. You quench your thirst, and you soon become quite lively once more. So with the plant; it quenches its thirst and lives on.

But water is not the only food the plant requires. If it got nothing else it would die, as you would if you had no other food but water. You must have bread and butter and meat and vegetables, and when you are ill you must have medicine. Now you see how much you resemble a plant, for it wants all sorts of solid food in addition to water. I have told you the names of some of these foods that the plant lives upon, and when you have learnt more about the plant itself I will tell you more about them. There are some hard names to remember which you need not learn now. The medicines which such plants need will also have to be studied later on.

Let us go back now to our little rootlet. We left it in the ground pumping up food to the shoot. Now, however, the shoot has grown so big and strong that the single rootlet cannot alone supply its wants, so a number of tiny, thread-like roots grow from the sides of the first rootlet, and these, being all hollow like the parent root, at once set to work to pump up food for the strong shoot above them. This shoot now sends out leaves. You may easily see the leaf being formed within a bean seed. The seed of some plants comes up out of the ground on top of the shoot, and remains there until it dries and falls off. It has nothing further to do with the plant. It produced the germ I told you of; then it afforded nourishment to the plant until it was able to provide for itself. After that it was of no use.

Now we see the more perfect plant gradually becoming larger, and constantly throwing out more leaves, aided by the greater number of little rootlets. As the plant food becomes used up near the ends or mouths of the rootlets, they stretch out further in search of it, just in the same manner as you would stretch out your hand to get at something at a distance from you.

Questions on Lesson 1.

1. What happens when a seed is placed in the ground?
2. What are the first three parts of a plant when it appears above ground?
3. Whence do plants obtain their food?
4. What is the "germ" of the seed?
5. What substance is necessary for all plants?
6. What is plant food?
7. How do plants take in food?
8. When a plant sends out leaves, how does it obtain the extra food it now requires?
9. When all the plant food in the soil near the root is exhausted, how do the roots obtain fresh supplies?

DESTRUCTION OF *SIDA RETUSA*.

Mr. F. ff. Swanwick writes, on the subject of destruction of *Sida retusa*, prickly pear, and *Lantana*, in praise of the effectual work performed in this direction with Street's White Ant Mixture. It is well known that arsenical preparations are destructive of many forms of plant life, and this is abundantly proved by the successful destruction of prickly pear in the experiments now being carried on by the Department of Agriculture. The whole matter resolves itself into a question of cost—the effect is clear. We have, however, not yet known of any experiments having been made on *Sida retusa* or *Lantana*. It seems strange that the grass amongst these pests should survive the ordeal, as

we have not heard that such has been the case in other experiments. We should be inclined to think that, even if the grass survived, there would be danger in allowing stock to graze on it, at least for some considerable time.

Mr. Swanwick's letter is as follows:—

"I have been experimenting through the winter with Street's White Ant Mixture, and I thought a few notes on results would be of interest to your readers. I used a weak solution—1 of the liquid preparation to 9 of water—and sprayed it on the plants I wished to destroy with a brass syringe. I find that the mixture is certain death to *Sida retusa*—that pest round Brisbane. The stronger the mixture the more quickly it kills, but 1 to 9 acts quickly and surely. The plants begin to wither the day after spraying, and in a week to ten days they are dead to the very roots. I was afraid that the grass growing among the *Sida retusa* would perish also; but I find that this is not the case, as the grass is now beginning to grow luxuriantly, while the *Sida retusa*, where allowed to stand, is withered and black and dead. The *Lantana* plant perished even more quickly than the *Sida retusa*. With a little more experimenting, my back allotment (¼-acre) will be clear. Wherever the *Sida retusa* is killed, the grass begins to grow well. Again I tried the mixture—but in this case I made the strength 1 of the liquid to 4 of water—on a large patch of prickly pear (*Cactus opuntia*) growing on some vacant allotments nearly opposite my residence. Part of the patch one of my sons and I attacked with a hoe and heavy sticks, breaking some of the flattened joints. Another part of the patch I did not disturb. I then sprayed the whole patch with the stronger mixture I have mentioned, and the whole patch, some twenty-five yards round, is now withered, whitened, and dead Fowls should be cooped up when the mixture is being used, and for some time after; but there is no doubt that the effect is simply wonderful. More persistent pests than prickly pear, *Lantana*, and *Sida retusa* can hardly be found, and I have told you how the mixture deals with them.

"P.S.—The *Sida retusa* was in many places 8 feet high, with stems near the ground from 1 inch to 3 inches in diameter."

MARKET GARDENING—WHAT AN ALLOTMENT MAY PRODUCE.

About a year ago we gave the experience of an amateur gardener at Milton, near Brisbane, who supplied his household with plenty of vegetables all the year round on 1⅓ perches of gravelly loam, about 1 foot deep, overlying a subsoil of stiff yellow clay. The *Australian Field* quotes from a statement by Dr. Andrew Wilson as to what the holder of an allotment at Brighton, England, succeeded in doing. The doctor said:—

"I had an interesting chat with the holder of an allotment at Brighton. He secured his plot under the Act. and rents it from the Corporation of Brighton, who, in turn, pay the Marquis of Bristol a fair rent for the land. The important point which has been forced on my attention is not so much that an allotment pays itself hand over hand when it is properly cultivated, but that a successful plot may be tended by a man who is not a professional gardener, and who during the day is engaged in quite a different occupation. The holder in question tells me that he is on his land at 5 a.m., doing what is necessary, and is found at his ordinary avocation by 8 o'clock. Once the land has been brought into fair cultivation it requires no very great amount of labour to ensure fertile crops. It demands constant attention, of course; the tax on time and energy is not great.

"Some of his figures will be read with interest by those who believe in the day of small holdings, and in the possibility of what would otherwise be waste land being made to yield a very handsome profit. In 1893 the holder began with 50 rods of land. His expenses were £11 13s. 1d., and his receipts from sales of vegetables and flowers £30 2s. 7d. In 1894 the expenses were £11 3s. 3d.,

and the gross receipts £46 3s. 10d. In 1896 he began to cultivate 60 rods, and in that year his expenses were £10 16s. 4d., and his receipts £60. Last year his outlay was £8 7s. 11d., and he sold his vegetables to the tune of £66 2s. 11d. Practically all kinds of vegetables are grown on the plot to which I allude, and there is a ready market locally for the produce.

"There has always been a good deal of talk indulged in regarding the producing powers of the land with reference to the support of population. It struck me while I listened to the record of what one man, assisted by occasional outside labour, can accomplish in his odd time, that much more might be done than is at present represented in the reclamation and cultivation of what would otherwise be regarded as waste and unproductive land. Mr. Rider Haggard is engaged in showing how agricultural depopulation proceeds, and affects the prosperity of rural districts. I wonder if it has ever occurred to him and to other investigators that the real secret of the failure of the labourer is his lack of personal interest in the land. Surely a man trained to gardening, or, at least, to field labour, should be in a better position to make his garden yield him a good income than my Brighton friend! I admit that the question of the sale of the produce is a difficulty, but a provision compelling railways to carry such perishable merchandise to big centres at cheap rates is not an impossibility. At the very least, the land produce would reduce the labourer's cost of living materially, and the work of cultivation would tend to imbue him with a deeper interest in the soil he cultivates."

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1901.

Farm.—Oats (6 acres) and wheat (4 acres) have been sown on land facing Tarampa road, formerly under maize. Weeds were cleared off 17 acres in creek paddock No. 2, the land ploughed and planted with malting barley. Five acres of old lucerne land in garden paddock have been ploughed up. A plot of land has been prepared for stud wheats; these were sown during latter part of month. Two varieties of wheat, Logan's Rust Proof and Anderson's Early Purple, were sown on land forming part of the garden area. Root crops, carrots, turnips, and mangolds were thinned and cultivated. Five and a-half acres of potatoes in creek paddock No. 1 were harvested, and the land prepared for oats. A small stack of cow pea was threshed. The land in bull paddock (1½ acres), formerly under panicum, was ploughed, and is now under wheat. An area of land has also been ploughed and prepared for experimental crops. The land under barley (formerly panicum), 17½ acres, has been rolled.

A series of manurial experiments have been commenced. Eleven plots of 16 perches each, separated by a space of 6 feet, were treated—nine plots with 4 cwt. each of unslaked lime, which was placed on the land after the first ploughing and allowed to remain for twelve days, when it was ploughed in; the land was then well rolled, harrowed, again ploughed, and the undermentioned manures applied:—

Plot.	Superphosphate. Lb.	Potash Sulphate. Lb.	Ammonia Sulphate. Lb.	Australian Potash. Lb.	Kainit. Lb.
2 ...	... 18	8	...	...	...
3 ...	... 18	...	5	...	...
4 ...	... ...	18	5	...	...
5 ...	... 18	8	5	...	...
6 ...	... 9	4	...	...	...
7 ...	... 36	16	10	...	...
8 ...	... 18	8	10	...	...
9 ...	... 18	...	5	16	...
10 ...	... ...	...	...	...	36
1 ...	... Barnyard manure, 7 tons. No lime used.				
11 ...	... No manure. No lime used.				

The fertilisers were placed in a drill and covered with an inch of soil; the seeds were then planted. The barnyard manure was ploughed in. Mangel-wurtzel seed was sown in the above plots.

The principal work on the farm was harvesting the maize crop, which promises to yield about 25 bushels to the acre.

Land was ploughed and prepared for planting *Paspalum dilatatum* grass. Five and three-quarter acres of old lucerne land were ploughed, harrowed, twice rolled, and planted with potatoes. Different methods in planting were adopted, some being ploughed in as a comparison with drilling. Manures were used on the various plots as follow:—

		Per Acre.
1.	Wood ashes	10 cwt.
2.	Australian potash	3 ,,
3.	Kainit	6 ,,
4.	Superphosphate	2 ,,
5.	Ammonia sulphate	1 ,,
6.	Australian potash	3 ,,
	Ammonia sulphate	1 ,,
7.	Superphosphate	1 ,,
	Ammonia sulphate	½ ,,
	Australian potash	1½ ,,
8.	Superphosphate	2 ,,
	Ammonia sulphate	1 ,,
	Kainit	3 ,,

Each plot contained 16 perches.

The manure was placed in the drills, and a little soil put upon it before planting the potatoes.

Chaff cutting for College horses occupied a large amount of time, as did also the haulage of material, &c., from Gatton, and the cartage and cutting of firewood.

The rainfall for the month was 1·53 inches, the principal falls being as follows:—5th ·23, and 6th 1·00.

Garden and Orchard.—A great deal of work has been done in this department in the way of clearing the ground of weeds, cultivating, planting vegetable seeds, and pruning fruit trees and vines. Two teams have been kept going regularly during the month, and the garden generally may be considered in very good condition, especially as regards cultivation.

Dairy.—The average number of cows milked daily was 51 head, the average yield being 17·4 lb. One thousand eight hundred and three gallons of milk were treated in the factory, 730 gallons being converted into cheese for a yield of 743 lb., and 1,073 gallons gave a return of 448 lb. of butter. The cows during the month were fed on green lucerne and barley and *Paspalum dilatatum* grass. The purebreds and crossbreds in full milk were rugged during the month. The purebred Holstein cow, Dairymaid, died from hoven after having been grazed on a lucerne plot; one crossbred calf also died.

The increase of dairy stock was as follows:—Jerseys, 1 male; Shorthorns, 3 females; Guernsey-Shorthorn, 1 male, 1 female; Ayrshire-Shorthorn, 1 male.

Piggery.—Increase: Berkshires, 3 boars, 7 gilts; Berkshire-Tamworth, 6. Sales: Berkshires, 5 boars, 7 gilts; Middle Yorkshires, 1 boar; Berkshire grade, 4 weaners.

Mechanical Department.—The principal work in this department was as follows:—Additions were made to the horticulturist's residence, a room being built at one end of the back veranda and the other end was partly boarded up. Alterations and repairs were effected in the case of one of the farm drays

Plate XII.

Crop of Swedes at State Experiment Farm, Westbrook.

and express wagons. Most of the gates on the farm were rehung to enable them to swing clear of the ground. The pumping boiler and that of the portable engine were opened and cleaned and put in thorough order. At the blacksmith's shop, in addition to the usual horseshoeing, scrapers were made for cleaning out the boilers, and ploughs, harrows, mowing machines, and other implements were repaired.

List of Stud Wheats Planted, July, 1901, Accompanying Monthly Report.

Farmer's Friend
Indian F.
Early Para
Indian Fife
F. I.
Aspen
Allora Spring
White Fife
Algerian
Yandilla
Best Strain
Early Baart
Indian Early
White Naples
Clubbed Indian
Indian Z.
White Lammas
P.P. Allora Spring
The Blount
King's Jubilee
Battlefield
Yandilla Improved Indian
Sterr's Early Purple Straw
Rattling Jack
Hudson's Early
Australian Talavera
White Essex
Steinwedel
Fillbag
Red Straw
Leak's R.R.
Zealand
Australian Wonder
Farrar's 84 B.Y.
Farrar's 85 (A1), (B1)
White Tuscan
Farrar's R.
Early Japanese
Budd's Early
Poingle's No. 5.
D.D.D.
D.D. 1
Ward's Prolific
Anderson's R.R.
White Lammas Young
P.P.
Pugh's R.R.
84 B.Y. Farmer's Old Strain
Medeah
Russian Shelton
Beal
White-eared Mummy
Leak's Rust Resistant
Messogan
Australian Amber
D.A.
Improved Allora Spring
Emerald
Leatre's Defiance
Victoria
Smith's Nonpareil
Bearded Monarch
Bearded Velvet
Australian Talavera
Leakrigg
Small's O.K.
Frampton
White Tuscan
Frame's Early
Blount's Fife
84 C.J.D. 2 Ferrar's
Australian R.R.
Early Bearded
Q. Ferrar's
Leak's Rust Resisting
Improved Allora Spring
Talavera de Bellcore
Brogan's Red and White
Poingle's Defiance
Bearded Club
Mammoth
Indian D.
Egyptian A2
Russian
Sicilian Bart
Calfermian Club
Forella
Marshall's No. 3
Cretan
Odessa Lans
Young's Bearded
Australian Wonder
T.T.
Mica
Q.N.
Atlantic
Improved Yandilla Indian
Poland
Paros
Dieke Mediterranean

SWEDES AT WESTBROOK.

Our illustration gives a very good idea of the crop of swedes harvested during August at the Westbrook State Farm. The particulars of the crop and its cultivation have been supplied to us by the manager, Mr. C. Ross. The variety is Anderson's Purple Top. The soil in which they were grown is a loose, volcanic, brown loam, overlying rotten rock, which had previously been under lucerne. The seed was sown on 16th March to the amount of $1\frac{1}{2}$ lb. per acre, which was the least quantity which could be distributed owing to the want of a turnip drill.

The drills were 3 feet apart, and the plants were subsequently thinned out to 16 inches in the rows. The only manure used was $\frac{1}{2}$ cwt. of bonemeal sown with the seed—not with the idea of increasing the weight of roots by any appreciable amount, but simply to give the seedlings a fillip into the rough leaf.*

When the seedlings were quite small, they were thinned out with the hand hoe, and afterwards, when well into the rough leaf, the crop was singled out by hand.

The cultivation consisted in horse-hoeing three times between the drills.

* The previous crops of lucerne doubtless enriched the land to some extent.—Ed. *Q.A.J.*

At the time of writing (3rd August), the crop was estimated to yield from 12 to 14 tons per acre, but the roots were then daily increasing in weight, and quantities of the dressed roots turned the scale at over 12 lb.; so that it was considered probable that the total crop would reach 16 tons per acre, which may be looked upon as a heavy yield in Europe under the most favourable conditions of fertilisation, soil, and season. [The final return has since been furnished, and shows that the actual weight of roots per acre sold was over 15 tons, not including what were consumed on the farm. Two tons of valuable fodder in the shape of tops went to the compost heap, there being no pigs to consume them.—Ed. *Q.A.J.*]

There was a very heavy crop of tops amounting to over 2 tons, which, unfortunately, could only be utilised in the compost heap, there being neither sheep nor pigs at the farm to utilise by-products.

The land had been got into the very best of order for the seed-bed, and, soon after sowing, gentle showers fell. The ground being warm, the seed was up in three days. Notwithstanding a very dry spell afterwards, the plants never stopped growing, a fact which proved the excellence of the tilth both before sowing and afterwards with the cultivator.

Mr. Ross considers this to be a very fine crop for less than five months' growth; indeed, the actual time of growth was only four months, as marketing then began—*i.e.*, in the first week of June.

The farmers in the surrounding districts are very keen to obtain information on the methods by which Mr. Ross gets such excellent results from his vegetable crops. Needless to say that such information and advice are gladly placed at their service. Many of the largest sheep-breeders visit the farm to gain information, and this crop of swedes has proved a revelation to them. The example will do a great deal of good, and will be largely emulated.

ARTIFICIAL MANURING.

All plants grow, come to maturity, and yield fruit only by the help of the plant food placed at their disposal either by nature or by art. Like members of the animal kingdom, those of the vegetable realm thrive on different varieties of food. Much of the food of plants, particularly carbon, is derived from the air in gaseous combination. Of this ingredient there are enormous supplies. Other plant food is derived from the soil, where it exists in limited quantities. Such are nitrates and mineral matter.

With such wonderfully rich soils as are daily coming into cultivation in this State, the question of manuring is a secondary one. For several years the man who farms any of these fertile lands has no need to exercise his mind on the subject of a supply of manure. He clears, breaks up, and cultivates his land year after year, and annually reaps a rich harvest when seasons are favourable.

But nature will not allow us to draw too extensively on the main stock of plant food hidden away in the soil. There comes a time when the over-strained land is temporarily exhausted, at least in so far as the available sources of supply are concerned. More fertilising materials are still stored there, but they are now out of reach of the roots of the plants, and the result is—poor crops. But both by nature and art these hidden treasures can be brought up and made available. Many fallow crops tend to enrich the soil or work in many ways against its exhaustion. Many collect nitrogen from the air by means of microdemes at their roots, and bring plant food to the surface. And, just as a scrub enriches the soil with its fallen leaves and rotting timber, so some of the leguminous crops leave a large amount of vegetable matter in the soil. The lupine especially has the property of bringing up food from the

subsoil and leaving a large proportion of it on the surface ready for a succeeding crop. Notwithstanding the prejudice in favour of farmyard manure, which in many cases is difficult, if not impossible, to obtain in sufficient quantity, there is no real difficulty in maintaining a farm in good heart by means of artificial fertilisers if these are used judiciously in conjunction with green manuring, composts, and such stable manure as is procurable. The best way of applying chemical fertilisers is in small quantities as helps to the general manures obtained by the decomposition of vegetable crops. The crops cultivated on a farm may be divided into "nitrogen *collectors*" and "nitrogen *consumers*." The nitrogen collectors are peas, vetches, clover, lucerne, &c. These gather their chief supply of nitrogen from the air, and thereby increase the quantity of nitrogen contained in the soil. The nitrogen consumers are cereals, grass, potatoes, turnips, rape, flax, &c. As they take next to nothing from the air, they must take it all from the soil in the form of nitrogenous salts.

It follows that it is wasteful to dress leguminous plants with nitrate of soda unless the soil is exceedingly poor in nitrogen, which can easily be known by the appearance of the plants, and then a small quantity of nitrate is beneficial.

As far as phosphoric acid and potash are concerned, it is unnecessary to exactly measure out the quantity required. An intelligent farmer puts an excess of these into the ground. But the nitrogen should be measured out as exactly as possible. The reason is that as yet we are not able to calculate exactly, in the case of a particular crop or soil, the quantities of phosphoric acid and potash to be used in order to produce the largest yield, or, what is the same thing, to bring into full activity the nitrogenous manure which is to be simultaneously applied. Hence the only course is to secure an *excess* of both. There is no risk of loss, because both these substances are imprisoned by the soil ready for later crops if the next following crop has no need of them. It is different with nitrogen. Nitrogen is not fastened up by the soil, but remains freely movable, and any residue left behind by the crop will be washed down in rainy weather and lost.

Nitrate of soda does not act on the crop while it is in the soil, for no sooner is it there than it is promptly taken up by the plant and increases its development. Wheat is usually sown on land in good heart, and no special application of manure may be necessary beyond a top-dressing of from 1 to 2 cwt. of nitrate of soda to be sown as soon as the plants are ready to take it up.

In an ordinary rotation in which barley succeeds a root crop, the phosphate and potash required by the cereal will be abundantly present in the soil, and all that is required is the application of some nitrogenous manure in sufficient quantity (say 250 lb.) to enable the plant to take up its mineral food.

Oats will give a largely increased yield in response to a much more moderate application of nitrate of soda than what is given to a wheat crop. In fact, experiment has shown that, with the application of equal quantities of nitrate of soda, oats and barley give an average excess in grain and straw double that of wheat and rye.

As a rule, the nitrate should be applied about a week or ten days after the young plant appears above ground. It will push on the crop through a critical period of growth, and enable it to withstand the attacks of grubs and other insect pests. As an example, the *Scotsman* records that a trial was made of 112 lb. of nitrate of soda per acre on Black Tartarian oats. Without the nitrate, the yield was 36 bushels per acre; with the nitrate, 64 bushels per acre. The oats weighed 41 lb. per bushel, while the straw on the plot which got the nitrate was at least one-third more in bulk.

The quantity of nitrate to be employed for oats of course depends on the nature of the soil and its manurial condition. If the soil is comparatively rich in nitrogen, a dressing of only from 84 lb. to 1 cwt. per acre should be given, and this may be either applied at the time of sowing or harrowed in, or, what is preferable in the case of light, porous soils, be simply broadcasted soon after

the seed is sown. If the soil is poor in nitrogen, an additional dressing of 84 lb. to 1 cwt. of nitrate may be given when the plants are well above ground, and a further application of 1 cwt. when the stem growth is complete and the ears are beginning to form. It is well, in order that the later dressings may have their full effect, to broadcast the nitrate just before rain, which will dissolve it. For mangolds, superphosphate is essential, but it gives a poor return unless accompanied by a liberal dressing of about 4 cwt. of nitrate of soda to 3 cwt. of superphosphate. Twelve tons of stable manure, 4 cwt. basic slag, or 4 cwt. nitrate of soda give excellent results. One hundredweight of the nitrate should be sown at seed-time, and the remainder put on in successive dressings of 1 cwt. each.

There is no fear of impoverishing the soil by the growth of heavy mangold crops with large dressings of artificials. On the contrary, the condition of the soil is raised—partly by the residue of unused manure, partly by the increased quantity of mangold rootlets left in the soil, and partly by the ploughing in of a more luxuriant crop of leaves or tops, so that the following grain crop is benefited by the raising of large mangold crops with liberal dressings. Turnips and swedes are gross feeders. They produce a great weight of material in a comparatively short space of time, and must therefore have within easy reach an abundant supply of readily available plant food. Swedes require a well-prepared soil in good condition, and in such a case nitrate of soda will prove a very profitable application.

An experiment was made in England on bronze-topped swedes in a field of rather poor loam, manured with 20 loads per acre of farmyard manure with and without nitrate of soda, with the following results:—

	Per Acre. Tons	cwt.
No artificial manure	15	10
Half-cwt. nitrate of soda	26	15

For potatoes, a large dressing of farmyard manure may be applied with advantage, but the dung must be supplemented with an application of a quick-acting nitrogenous manure such as nitrate of soda, and with a little phosphate and potash. Sulphate of ammonia should not be used, as it causes the production of an undue proportion of small tubers. The manure must not be placed in direct contact with the sets, but should be applied some time before planting. The method employed by a large grower of potatoes is: 1½ cwt. nitrate of soda and 2½ cwt. of mineral superphosphate per acre sown in the drills or furrows, and the soil is then turned onto them with the drill plough, after which the ground is rolled, and the sets are planted over the fertilisers with about 4 inches of soil intervening. A top-dressing of 100 cwt. of nitrate per acre is applied when the plants are getting well away.

THE WIRE-WORM.

Wherever it is noticed that the growth of wheat has been checked, and the presence of wire-worm is indicated by the loosening of the plants, remedial measures should at once be taken. These consist in top-dressing with a quick-acting fertiliser, breaking up and freshening the surface with the grass-harrow, and then firmly rolling it. The freshly stirred earth being firmly pressed round the plants assists the roots to get a fresh hold, and greatly aids the manurial application in renewing the growth.

One hundredweight of nitrate of soda and two hundredweight of superphosphate, broken up and finely screened, and mixed *just previous to spreading on the field*, will be a suitable dressing per acre. The solubility of the nitrate rendering it immediately available, the effect is at once perceptible by the deep-green colour and vigorous growth of the plants, which are quickly brought

beyond the reach of the wire-worm. By the addition of the phosphate, the full effect of the nitrate dressing is secured, the straw strengthened, and the crop assisted throughout the entire period of growth.

Early-sown wheat, at a critical period of growth, when the plant is just beginning to form an independent existence by throwing out roots, is peculiarly open to injury by the attack of the wire-worm. The injury done to the crop is often so serious as to necessitate the ploughing up and re-seeding of the field. On our fertile soils much good may be effected without the use of a fertiliser, by merely harrowing and rolling. These operations will conduce largely to the destruction of the wire-worm.

Nitrate of soda is worth 15s. per cwt., superphosphate 5s. per cwt. Thus the cost of applying the above top-dressing would, including labour, amount to about 27s. per acre. Unless, therefore, a 20-bushel crop can by its use be increased to 30 bushels, it is questionable whether the extra cost would justify its application, except, of course, for the purpose of saving the crop by the destruction of the wire-worm.

LUCERNE ENSILAGE.

A late Colorado bulletin gives some tests made of alfalfa or lucerne as an ensilage plant. One test, says the bulletin, was made with the alfalfa put in whole as cut in the field; the other with alfalfa cut to quarter-inch pieces, as we cut our corn for ensilage. The whole alfalfa showed a spoiled layer 3 inches thick on the top and 1 inch layer round the side nearly all the way down. The ensilage of the bottom and middle was excellent, and was greedily eaten by the cows and calves. Its loss in the total weight was 10·7 per cent.; but its loss in feeding value was probably a little larger.

The other silo was filled with cut alfalfa. The next day the silo was covered with two thicknesses of building paper and one of boards, and weighted with stone to about 55 lb. per square foot. When covered, the ensilage was hotter than the hand could bear. Two days later the temperature had fallen to 83 degrees Fah., and in two days more it had fallen to that of the air. The ensilage shrank and settled a good deal. When put in, it contained 3 per cent. of dry matter. On opening, the silo showed 2 inches of spoiled ensilage on top and ½ inch on the sides. The spoiled ensilage was 7·3 per cent. of the total weight. The loss in dry matter was approximately 10 per cent.

It is fair to presume that with a good tight silo well-made ensilage from cut alfalfa should not make a larger loss than was here given in our experimental silo, or about 10 per cent. of its feeding value. To make good ensilage from whole alfalfa is a much harder proposition. It requires that the alfalfa be quite green; that the silo be both tight and deep; that the alfalfa be thrown into the silo in small forkfuls and carefully tramped, and that it be weighted, by from 4 to 6 feet of some heavy, tight-packing material, like cut corn fodder. If the alfalfa is put up in the middle of summer, in clear bright weather, it must be raked and loaded just as fast as cut. One lot we tried was too dry for ensilage two hours after it was cut.

Comparing the three methods of handling alfalfa—in the stack, in the barn, and in the form of ensilage—the bulletin says that, under the best of ordinary conditions, for every 100 lb. of feeding value as it exists in the green alfalfa at the time it is cut by the mower, 75 lb. will be saved if the hay is well cured and put in a stack under good conditions; 86 lb. will be saved if put in the barn, and 90 lb. can be expected if made into first-class ensilage. In the comparison of the ensilage and the stacked hay, the principal advantage of the ensilage must lie in the fact that the alfalfa can be put in the silo, even under bad conditions of weather at time of cutting, and that once siloed it is safe from the worst weather.

TRANSPLANTING MANGEL.

A correspondent of the *Agricultural Gazette*, London, writes as follows on the subject of transplanting mangel :—

Relative to the above subject, I have transplanted more or less mange- every year, and almost invariably with success. In my opinion the one thing most essential is that the plants are large. Unless the weather is very damp, the root should, if possible, be as large as a pigeon's egg, but, practically speaking, the larger the better. The great difficulty in practice is having plants of sufficient size, as at the usual time of singling out they are not large enough, but the only best thing to do under the circumstances is to collect during singling time the largest of the plants and set them on the ground in some cool, damp, shady position, to be ready for transplanting when the weather is favourable or time permits ; and they will hold good for a length of time if they are not exposed to the weather, and are better for transplanting when pulled for a week, if properly kept.

The tops should be twisted or cut off about 4 inches from the root. They should be planted firm in the ground, but not too deep, as the crown of the root should not be covered.

The above remarks apply equally to the transplanting of swedes, which I also found to do well and far better than resowing, but mangel will transplant better in dry weather. It must be borne in mind that by transplanting the labour of singling out afterwards is saved. If the field is infested with wire- worm, and the rooks have pulled the mangel up, they are sure to go for those newly transplanted, and in this, too, the large plant has the best chance. The success in transplanting in a dry season will, I have no doubt, be pretty much in proportion to the size of the plants used.

I may state that all my experience in transplanting mangel and swedes was in good, fresh, well-manured land, and I cannot say what degree of success would likely be attained under less favourable conditions of soil.

SCIENCE IN AGRICULTURE.

From time to time someone denies the value of science in agriculture. Not long since in the legislature of a rich agricultural State a member, in opposing a Bill which called for an appropriation for educational purposes, stated that the best farmer in his neighbourhood did not know how to read and write. The time has since long passed into oblivion when it is necessary to repel the assaults upon scientific agriculture. While occasionally a man entirely ignorant of science may be a good farmer, no one can attain the highest success unless he understands the principles which underlie agriculture. He must know something of soils and fertilisers, plant and animal growth, nitrogen's place in agriculture, the nature and changes which take place in milk, butter, and cheese, &c. During the last twenty years it has been demonstrated over and over again that a thorough understanding of these general principles and their practical application are great factors in successful farming.—*American Agriculturist.*

MIXED FARMING—SHEEP ON FARMS.

In our August issue we answered an inquiry as to whether it would pay a farmer to keep a flock of sheep. At a meeting of the Morphett Vale Branch of the South Australian Bureau of Agriculture, the general secretary read the following notes on sheep :—As a rule it does not pay a farmer to try and deal in sheep as many do. They buy sheep from the north, bring them down here, and the sheep very probably go back in condition, and the owner loses money. The most profitable thing for any farmer in this district is fat lambs. They must generally be satisfied to buy old sheep, as the young ewes in the market

are usually inferior, so get good full-mouth ewes and take, say, a couple of seasons out of them, then sell again as fat as you can get them. Do not mind paying a fair price for a ram, and do not make the mistake of letting him run all the year round with the ewes. Either have a small pen and hand-feed him, or get someone to paddock him who has a flock of rams. Put the ram with your ewes about 1st December, and take him out in April. It will pay any man who puts in 100 acres every year, and has 100 fallow, to keep sheep. If he cannot keep more, thirty ewes and a ram will generally return twenty-seven or twenty-eight lambs, and frequently more. Now these lambs will fetch about 8s. or 9s. each, and if extra prime up to 12s. The wool off the ewes is another item, and even at present prices would return about 4s. per sheep, or say 12s. for the wool and lamb per ewe, which on thirty ewes is £18, which at present represents a small stack of hay. They will keep the weeds down, and a harrowing will do for the fallow instead of a scarifying. The cost of sheep-proofing is not much. A three-wire fence around a section would require, say, four more wires, which only means about £1 6s. a wire besides labour. About £8 would pay wire and labour to make a whole section sheep-proof, and this would be returned the first year. It can be nothing but profitable, and the cost is small; and I urge everyone with three or more sections to try it.

LOCALLY-GROWN MANITOBA, OR DULUTH WHEAT.

We have received from Mr. E. H. Gurney, F.C.S., the following article on Manitoba wheat, originally published in the New South Wales *Agricultural Gazette*, which will doubtless prove of interest to wheatgrowers and millers in this State. Mr. Gurney explains that the figures under "percentage of mill products" are calculated from the actual products obtained, and not from the original weight of wheat milled. "Strength in quarts water" means the number of quarts of water a flour will absorb to make a dough of a given consistency. This water-absorbing power represents the quantity of bread that can be made from any flour (as illustrated in the article), and indicates also the rising power of the dough.

The following is the article referred to:—

(From Agricultural Gazette of New South Wales.)

By F. B. GUTHRIE,

Chemist to the Department of Agriculture, New South Wales.

A glance at the commercial columns of the daily Press is sufficient to convince wheatgrowers how important is the question whether Manitoba grain can be profitably cultivated in the colony, or whether, as some have predicted, it is liable to deterioration when grown in our climate and soil.

The present market quotations for wheat and flour (wholesale) are as follows:—

Milling wheat, 2s. 8½d. to 2s. 9d.

Flour, £6 5s. to £6 10s.

Manitoba flour, £9 10s.

Local buyers are prepared to pay £3 per ton more for flour made from Manitoba grain than for flour obtained from the locally-grown varieties of wheat—that is, half as much again.

I suppose the characteristics of this flour are pretty well known to all who are likely to read this. The so-called Manitoba flour is probably all imported from Duluth, and whether it is milled from Manitoba or Duluth grain is of no importance. The grain is identical, or is of the same kind, and is a Fife grain.

The characteristics of the Fife wheats have been often enough discussed in the *Gazette*. In the mill they differ from the softs wheats principally in producing a flour of superior strength or water-absorbing capacity. This is the

same as saying that a larger amount of bread of better quality is obtainable from the same weight of flour; being also richer in gluten, a more nutritious loaf is produced.

In colour the flour is usually lower than that of the flour from soft wheats, but this colour is susceptible of improvement when grown locally, as I hope to be able to show.

The grain itself requires somewhat different handling in the mill, which is no doubt the reason why most local millers prefer to buy the flour in preference to the grain. The flour is bought to mix with locally-milled flour to improve its strength.

The Duluth grain has now been tried for four seasons in some parts of the colony, and I think we are now in a position to discuss the question of its deterioration. The difference in milling qualities between a typical sample of *imported* Duluth wheat and of one of our own wheats, such as Purple Straw, is shown in the following table, which represents the mean of average samples:—

		Duluth Wheat (*as imported*).	*Purple Straw.*
Nature of grain ...	...	Hard, red small.	Plump, white, soft.
Weight per bushel in lb. ...	...	... 61·5	61·5
Percentage of mill-products	Flour	... 73·0	72·0
	Pollard	... 8·0	12·0
	Bran	... 19·0	16·0
Nature of flour	Gluten ...	... 12 per cent.	9·0 per cent.
	Strength in qts. water per 200-lb. sack	... 61·0	48·0
	Colour ...	... Low, dark.	Excellent.
Milling notes		Easy to mill, semolina yellowish tinge and granular. Bran and pollard, reddish colour. Bran, clean; pollard, clean; flour, heavy and gritty.	Easy to mill; flour clings to bran; semolinas white and soft. Bran and pollard, fairly clean; flour, light and bulky.

This table indicates pretty well all the differences between the two varieties of grain. The bran of the Duluth wheat is more easily cleaned and is not so flaky nor of such good appearance as the soft wheat bran Unless previously conditioned, the bran is liable to become chopped up in the milling.

The flour of Duluth wheat is very dense, and, however finely dressed, has always a somewhat gritty feel between the fingers. It is rich in gluten; the locally-grown, soft wheats being very low in this ingredient as a rule, though the gluten-content varies considerably with the season.

But the principal differences between the flours lie in their different strength and colour. Assuming a loss of one-ninth of the weight of the dough in baking, the strength of 61 given by the Duluth wheat represents 313 lb. bread obtainable from the 200-lb. sack of Duluth flour as against $284\frac{1}{3}$ lb. bread obtainable from the sack of Purple Straw with a strength of 48, or a difference of $28\frac{2}{3}$ lb. per sack in favour of the Duluth flour.

In addition, the quality of the bread is superior, the loaf is superior in pile and texture and in flavour, besides being more nutritious on account of its higher gluten-content.

Against these advantages is to be set the objection that the colour of the loaf is never so good as that obtained from the white wheats, and this is to many an insuperable objection to the use of Manitoba flour by itself for baking.

The figures given above were obtained from samples of *imported* Manitoba. Samples of this grain have been distributed by different individuals to farmers in various parts of the colony, and have been grown in some districts for four seasons in succession. I append the results obtained by the examination of a few samples of the last harvest, 1899-1900, in order to show that, as far as their milling qualities are concerned, the grain has not deteriorated in the slightest, but has preserved unchanged the characteristics which render it so valuable.

Goulburn.—This is the fourth season that the grain has been grown in this district. After the first harvest there was a marked superiority in appearance over the imported grain, the berries being much plumper and more even. The milling was as follows :—

Variety of grain—Duluth.

Appearance of grain—Fair size, reddish, hard.

Weight per bushel—61 lb.

Percentage of mill-products: Flour = 68. Pollard = 11. Bran = 21.

Nature of flour: Gluten = 12·16 per cent. Strength in quarts per 200-lb. sack = 59·2 (representing 309 lb. bread per sack). Colour—Very good; slightly yellowish.

Milling notes.—Fair to mill; bran and pollard, fairly clean—perhaps more flour could have been obtained from them without affecting the colour; semolina, rich yellow tinge, and very gritty.

The colour, though yellow, is not dark, as is the case with the imported grain, but bright and clear, of good surface, and should make a white loaf.

This sample is a shade lower in strength than the imported grain quoted previously, but is still very high compared with the white wheats, and it cannot be said to show any deterioration in this district either in strength or gluten, while the colour of the flour has distinctly improved.

With regard to its characteristics as a crop, Mr. Conolly, of the Goulburn Flour Mills, has kindly obtained the following information for me from the grower:—The yield was 27 bushels to the acre, 24 acres went 27 bushels, and 8 acres went 30 bushels. The wheat stools wonderfully, and, if sufficient rain had fallen at the end of November or the beginning of December, the grower thinks the average would have been 35 to 40 bushels. Mr. Conolly, from his experience in the Goulburn district, says that Duluth wheat yields fully 20 bushels all round. In the wet seasons it is the only kind fit for milling, other grains being too soft.

Armidale.—Mr. J. Richardson, of Armidale, forwards a sample of Duluth grown in that district; it milled as follows :—

Variety of grain—Manitoba.

Appearance of grain—Fair size, plump, red, hard.

Weight per bushel—63 lb.

Percentage of mill-products: Flour = 72·0. Pollard = 7·1. Bran = 20·9.

Nature of flour: Gluten = 11·17. Strength in quarts per 200-lb. sack = 63 (representing 317 lb. bread per sack). Colour—Excellent, clear good surface.

Milling notes.—An easy milling wheat. Semolina yellow tinge, very gritty, bran and pollard clean.

In this case also the strong-flour characteristics are well maintained, and the colour of this flour is exceptionally good—quite as good as the best Sydney flour.

In view of this result it would appear that the endeavour to obtain a strong-flour grain giving a flour of the highest colour is not by any means impossible of attainment.

Of this sample Mr. Richardson reports that the crop from which it was taken went 25 bushels to the acre. Mr. Richardson states that the district is suitable to this kind of grain.

Gundagai.—A sample of Duluth grown at Gundagai was entered for competition at the local show recently held. As might be expected, the results

are hardly as good as with the grain grown in the Goulburn or New England districts.

Variety of grain—Manitoba.

Appearance of grain—Small, red, very hard.

Weight per bushel—62·2 lb.

Percentage of mill-products: Flour = 70·4. Pollard = 12·8. Bran = 16·8.

Nature of flour: Gluten = 10·93 per cent. Strength in quarts per 200-lb. sack = 56 (representing 304 lb. bread per sack). Colour—Rather dark.

Milling notes.—Bran and pollard very clean. Semolina yellow tinge, and very gritty.

As this is the only sample I have had from Gundagai, it is not quite fair to draw conclusions, but this particular sample shows distinctly a slight deterioration from the type. The strength of flour is lower, gluten lower, and there is no compensating improvement in colour. There is proportionately more pollard and less bran, but too much importance must not be attached to this last point, as different treatment would alter the results.

One would hardly expect that Gundagai would be a suitable district for this grain, and probably the apparent deterioration is a real one.

Temora—A sample forwarded by Messrs. Blair and Symes from this district gave the following results:—

Variety—Manitoba.

Appearance—Fair size, plump, red, hard.

Weight per bushel—60·1 lb.

Percentage of mill-products: Flour = 71·8. Pollard = 10·5. Bran = 18·7.

Nature of flour: Gluten = 15·41. Strength—quarts per 200-lb. sack = 55·2 (representing 300 lb. bread per sack). Colour—Yellow, good surface and texture.

Milling notes.—Bran and pollard clean. Semolina slight yellow tinge, and very gritty.

Here, again, the characteristics are well maintained, though not in so high a degree as is the case with the Goulburn and Armidale samples.

The question, therefore, of the suitability of the climate or soil in some districts of New South Wales for growing Duluth wheat is, in my opinion, finally answered.

No better milling wheats are conceivable than the Armidale and Goulburn samples (the Armidale especially). The yield is also entirely satisfactory.

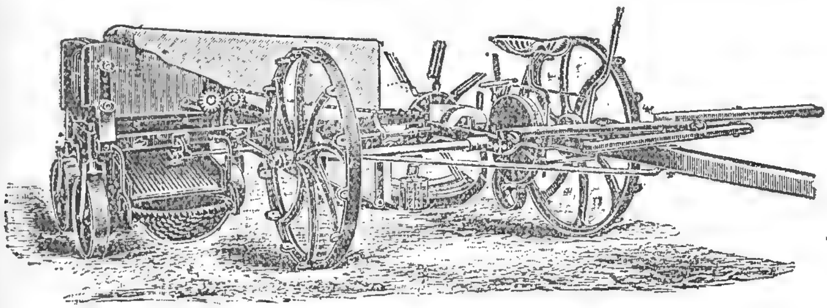
The grain grown in Goulburn and Armidale is a considerable improvement as a milling wheat on the imported grain, whilst at the same time retaining all its strong-flour characteristics. Although I consider that the question of its adaptability to some parts of New South Wales is settled in the affirmative, I do not, therefore, recommend its production to the exclusion of the familiar varieties. I believe that in the future it will be extensively grown, but at present millers prefer to pay £3 a ton more for the flour than to purchase the grain, which would involve slight modifications in the method of milling. If, however, they are assured of a regular and sufficient supply of locally-grown Manitoba wheat at the ordinary rates, it cannot be long before they will take advantage of the opportunity. It must be remembered that the colder and the coastal districts, where wheatgrowing has been discontinued owing to the unsuitability of the climate for the soft wheats, are just the districts more particularly suited to the cultivation of Manitoba grain.

A POTATO DIGGER, SORTER, AND GATHERER.

Most farmers in this country have seen and many have used the potato-digging plough. In the old country much use is made of an invention which not only digs, but gathers and grades the tubers, filling them into hampers attached to the machine, as shown in the illustration which we take from the *Farmer and Stockbreeder.* The saving of labour and time by its use is very considerable, only two men being required to work it. It is manufactured by a Sheffield firm (Messrs. J. Crowley and Co.). We are not aware that it has made its appearance in this State as yet, but it would appear to be the very thing for extensive growers of potatoes in a country where the farmers often find it difficult to obtain a supply of good hands at the right time.

The potatoes are raised in the usual way, but a grid is placed behind the share which prevents the potatoes from falling to the ground. As the forks revolve, the potatoes are thrown on to the elevator, which is continually travelling upwards.

The potatoes, culms, and weed are carried forward on to a secondary elevator, which has wide divisions. The potatoes fall through these wide divisions on to a riddle below, the large being delivered into a hamper on one



side of the machine, and the smaller ones, which fall through the top part of the riddle, are delivered into a hamper on the opposite side. In this way small and large are separated effectually.

The riddle has a cross action, and by this means the soil thrown up with the potatoes is thoroughly pulverised or riddled, and falls on to the ground.

The weeds and culms are carried over the top of the second elevator, and fall in a row upon the ground in the rear of the machine. When the hampers are full a shuttle or door is shut down at the mouth of the riddle to prevent further potatoes falling while the hampers are being changed.

The machine requires only two men to work it (with the assistance of a boy to look after the hampers), one man to drive, and another to follow to replace the hampers as they are filled.

It will thus be seen that all extra hands usually required to gather up the potatoes as they are scattered upon the ground are dispensed with, and so a very considerable saving is gained.

A LIGHT GERMAN SULKY PLOUGH.

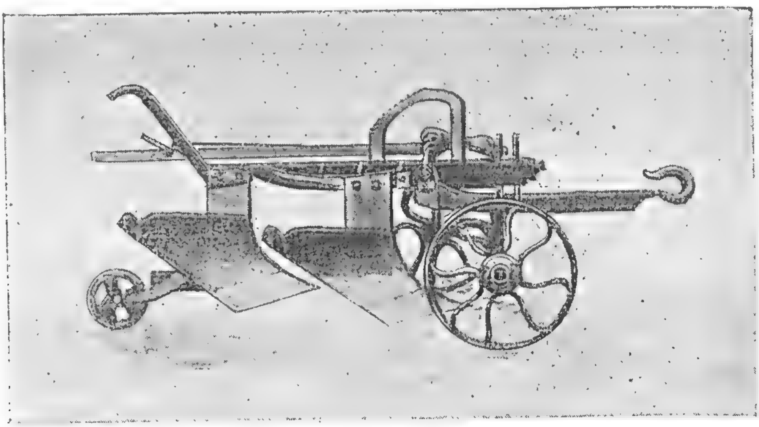
Mr. H. Newport, Instructor in Coffee Culture, sends us a sketch of a German sulky plough, of which he says:—

This plough, sketch of which I enclose, can be seen working on the selection of Mr. J. Baumann, on the Daintree River. The proprietor speaks very highly of the work it does, the ease with which it can be used, and the unusual cheapness, combined with strength and good workmanship.

The plough, named "Patent-Normal-Pflug," is manufactured by Carl Beermann, of Berlin, and is like a sulky plough in shape, but has no seat. It can be used as either a double or single furrow plough, is strong in construction and light of draught. The small hind wheel attachment, being only used for purposes of transport, is removed when work is commenced. This implement may be used with two, three, or four horses, but when in single furrow two very light horses can draw it with ease.

Mr. Baumann, of the Daintree, was observed breaking up newly-stumped land with two horses so light that they could only by courtesy be called "draught" horses, and which, indeed, he himself called "pack" horses. The furrow was clean and to a depth of 7 inches, the turnover complete, and the weeds and grass that existed were buried as completely as could be desired without any separate attachment or effort on the part of either workman or animals.

It is claimed that the ploughman has only to lead his own horses and pay no attention to the machine, which does its own work—a point that meant a great deal in Mr. Baumann's case. This gentleman met with an unfortunate accident a little time back that almost deprived him of the use of one leg.



Guiding and following an ordinary plough, therefore, became a matter of very great labour, and while it was sometimes necessary to call in assistance to lead the horses it is now quite unnecessary.

The plough takes two furrows 8 inches wide with three light draught horses, or one furrow 10 inches wide with two horses to a depth of 7 to 10 inches. With four horses it is said it will turn over to a depth of 1 foot The depth is regulated by a lever arrangement which can be moved while the plough is in motion. The mould-boards are long, and the coulters used the ordinary knife.

With the implement are supplied three mould-boards and shares, and one extra strong and heavy mould-board for deep work, two knife coulters (disc coulters can be substituted if desired), and a large skimmer which cultivates to a depth of 3 inches or so.

The cost of the plough and these attachments is £9, f o.b. port of delivery (in this case Port Douglas). The one imported by Mr. Baumann is the heaviest of three sizes (No. 5, NNCF), the others costing some £1 or so less than even this price.

It would, undoubtedly, seem to be a plough of good workmanship, strength, lightness of draught, cheapness, and eminently satisfactory working. The owner claims that he can do, alone and with less strain on his horses, as much in two or three hours as he could with the handled long plough in a day.

PASPALUM DILATATUM.

"Oxonian," Bundaberg, sends the following account of his experience of this fodder grass:—We are constantly reading in the agricultural papers notices of the grass *Paspalum dilatatum*, many of which I think are very misleading. A few notes, therefore, on our own experiences with the same may prove acceptable to some of your readers. We commenced in a small way with a parcel of seed some five years ago, and have had it constantly under observation during the whole time. We now have several acres of it, and find that it grows readily from seed sown in hot and moist times, seldom germinating in cool weather. It is very easily transplanted from the seed bed, grows quickly in summer time, does not make much growth in cold weather, turns a brown colour with 6 degrees of frost, and, during the hot day and trying time of the present year, was just as much done up as many of the indigenous grasses. It is *not* easily destroyed by ploughing, &c. It is impossible to kill it with an ordinary horse cultivator in the summer time if there is any moisture in the soil. In showery weather it seems to grow better for being knocked about by the horse hoe. Owing to the lightness of the seed it is constantly turning up in unexpected places in the cultivation paddocks, and a fair stool of it will throw out of ground an ordinary 2-horse plough. Stock are fond of it. We consider it a good grass, but would advise any of your readers thinking of giving it a trial to keep it clear of their cultivated land, or sow in some out-of-the-way and lowest corner where it cannot so readily spread. I believe it will yet prove a great nuisance to farmers. I am aware that this is very different to what we generally read, but those facts are given from our experience with it.

THE WHEAT CROPS.

From all the wheatgrowing centres we hear the same bright accounts of the growing crops. From personal observation we have reason to think that, given seasonable weather, and consequent absence of rust, the coming crop may be reckoned at fully 25 per cent. more than that of last year. In the Warwick district the crops are expected to be 30 per cent. greater. Some of the wheat, in consequence of so much showery weather, appears to be too rank, but many of the fields have been eaten down by sheep, and give promise of a bountiful harvest. The crop of grain totalled in 1900, 1,194,088 bushels. The coming crop under favourable conditions will probably not fall far short of 1,500,000 bushels.

Barley and rye are doing equally well, the rye being well in the ear. Here and there a little summer rust may be seen, but this will not affect the crop. During the year 1900, the production of wheat in Queensland equalled 33·7 per cent. of the total requirements of the State. The present outlook indicates that there will be a considerable diminution in the imports of both flour and wheat. What the price of wheat will be is as yet matter of conjecture. At present it is very low, whilst in New South Wales the price is about 2s. 9d. per bushel. The prices of Australian wheat in the British market are as follow:—

South Australian	28s. 6d.	per 480 lb., or	3s. 6¾d. per bushel.
Victorian...	... 28s.		3s. 6d. ,, ,,
New Zealand	... 29s. 3d.		3s. 7·8d. ,, ,,
New South Wales	26s. 9d.		3s. 4d. ,, ,,

THE RABBIT PEST.

In the Southern States of the Commonwealth the rabbit and hare pest has been turned to such good account that during the past twelve months no less than 1,500,000 pairs of rabbits, valued at £94,290, were exported from Victoria. From New South Wales the export of hares is expected to reach 100,000, whilst from January to July this year already 64,600 hares have been exported.

Rabbits and hares abound in Queensland, but what is done with them? Hares are shot by the hundred, a few are sent by the shooters to their friends, but the majority are left to rot where they fell. Rabbits are trapped and poisoned wholesale, but no attempt has been made in this State to turn either of these animals into a source of revenue. The work of trapping and preparing them for export gives employment to numbers of men in the bush as trappers, &c., and to graders, packers, and crate-makers in the towns. Yet there are a certain number of men out of employment who, instead of being a burden on the community or on their unions, might find profitable employment in this industry, if only an export trade were established here as in the Southern States. Why should the Brisbane shops be stocked with Southern frozen rabbits when we have thousands of the animals in our own State eating out the grazier and causing a great expenditure to the Government and to private individuals, which could by judicious management be made to contribute to the public and private revenue.

RABBIT TRAPS.

From] an exhaustive article on "Rabbit Control and Destruction" by Mr. Alex. Bruce, Chief Inspector of Stock in New South Wales, which appeared in the July issue of the *Agricultural Gazette* of that State, we take some plans and descriptions of rabbit traps which cannot fail to be of interest and value to those who are unfortunately afflicted by the rabbit pest in Queensland.

Referring to a diagram and description of a water trap at an enclosed tank, Mr. Bruce says:—

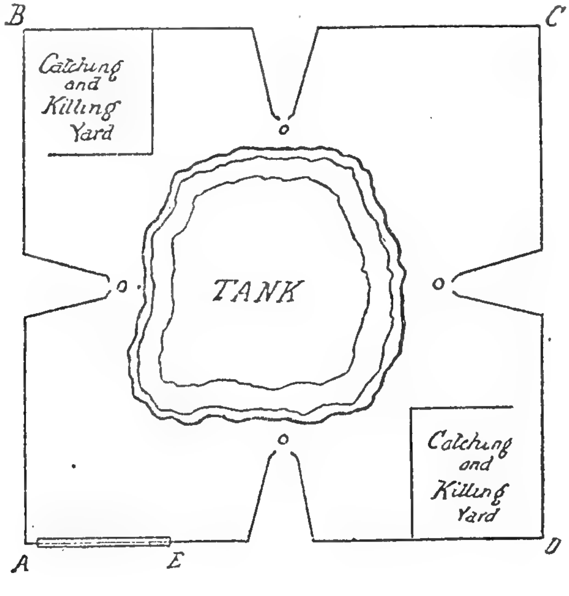
A much more easily constructed and less expensive trap is No. 2.

A Water Trap at Open Tank.

And, if it proves equally effective, will take its place, but very great care should be taken to see that the fences are of the proper height, and that they, as well as the entrances and gate, are all thoroughly secure, and that the necessary capping is provided and properly adjusted on the fences.

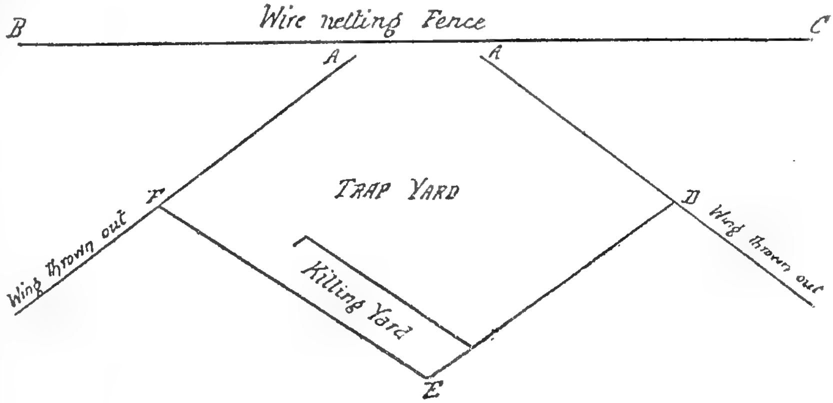
Sides A B, B C, C D, and D A are wire-netting, with entrances at the points in the sides marked "O." fitted with needle arches or spiked funnels.

Gates of the necessary description and size to allow the stock to water in the day time should be made as marked at A to E, or any other suitable part of the fence.



Yard and Tip-traps on Wire-netted Rabbit Fences.

This trap is erected on a rabbit-proof fence, as rabbits have a habit of travelling along fences. This fact is also made use of in the pit-fall trap described next.



B C is the wire-netting boundary fence. A convenient size for the trap is to make the sides F E, E D, and F A and D A to where they join the netted fence at needle arches or spiked funnels at A and A, about 20 feet long.

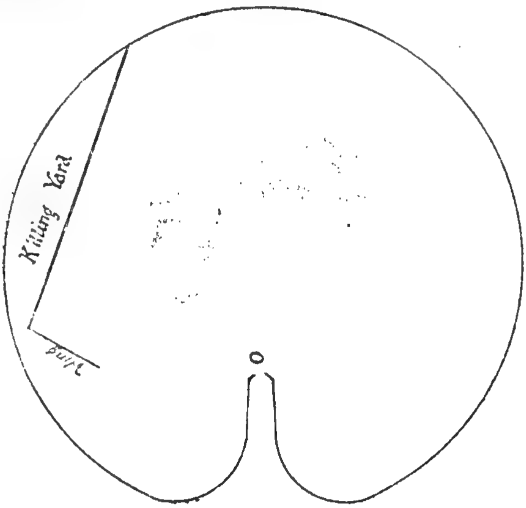
It is a good plan to throw wings out about 30 feet beyond the yard and leading to the needle arches.

Water Trap.

As will be seen from the diagram, this trap is in the form of a circle, with a small lane leading into the needle arch or spiked funnel. The circular form is an advantage where the trap is made on the moveable principle, which it has been in several cases, and caught large numbers of rabbits. In this form it can be easily and quickly erected, or taken down and removed to a fresh watering-place; but great care should be taken that the netting is of sufficient height—that it is sunk, say, 9 inches in the ground—and otherwise thoroughly secure, as rabbits are extremely difficult to keep, especially where they are confined in large numbers.

It is constructed by driving stakes at short distances apart into the ground and sinking the netting to the depth mentioned. The fence should be capped at least at every stake.

Rabbits striking the netting anywhere will follow it for an opening, and find it at "O."



Fall-pit or Tip-trap.

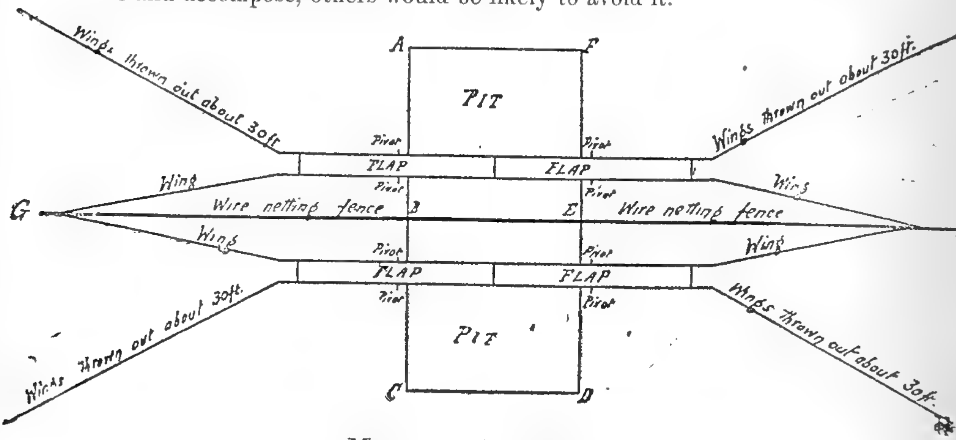
The fall-pit or tip-trap is the most extensively used, and the most constantly successful trap that has been tried so far, and, when constructed in a sufficiently large number of places, catches an immense number of rabbits. Well and strongly made, it will last for years, and being self-acting is always ready.

The pit for the trap A B C D E F should be about 4 feet deep, 4 feet wide, and about 8 feet long—4 feet on either side of the fence G H, and should be lined with netting or logs to prevent burrowing, and also be closely covered with timber.

The flaps (of which there are two each side of the fence) should be about 4 feet long and 6 inches wide, and should fit closely; but not so as to jam. They should be balanced on their pivots—which may be of light iron, resting in auger-holes in a wooden frame—that when at rest they form a level track. Supported at the end away from the pit, the flap tips only when the rabbit arrives over the hole, and so throws it into the trap, and then falls back to original position.

Flaps made of thin iron give the best results, as they are not affected by the weather, which causes wood to swell and warp.

The trap should be regularly visited and cleared. If the rabbits were left to die and decompose, others would be likely to avoid it.



Mixing of Phosphorus.

Cautions to be Observed in Mixing and Laying.

Any intelligent man could be taught to handle phosphorus and prepare phosphorised baits without carbon with safety in two lessons. Like everything else, however, this requires judgment and care. If the phosphorus is dissolved without the carbon, the person doing so should keep to windward of the fumes while preparing the baits; if he does happen to inhale a little, it will not hurt him. They should be prepared in the open air.

The risk in using the phosphorus in this way is slight, but, lest ordinary care is not bestowed, the following detailed directions are here given, which will apply where phosphorus is dissolved without carbon, whatever the medium may be which is used:—

Take two 3-gallon buckets, and before commencing to prepare the mixture see that they are quite clean. Then have a supply of cold water within reach; put the proper quantity of water (say 1 gallon in one of the buckets, and ½ gallon in the other). Start the fire, and place the pollard or grain and phosphorus ready to hand. Put the buckets on the fire, and as the water in the bucket with 1 gallon boils take it off the fire, break as directed, and put the phosphorus in the water, and stir quickly. At that temperature the phosphorus, with constant quick stirring, will be disseminated throughout the

water in about five minutes. The person mixing should be provided with a stick 4 feet long, with a flat point to lift the bucket off the fire, and to stir the mixture.

Then, in the second bucket, with the ½ gallon of water, put the sugar or molasses, and when thoroughly dissolved add to the dissolved phosphorus, together with, say, ½ gallon cold water, and stir thoroughly. Then add pollard in small quantities. The safer course would, however, be, where the pasture will burn, to not adopt the mode here described of dissolving the phosphorus, but to use carbon, and only dispense with that chemical when the grass is green.

Phosphorised Grain.

Phosphorised Oats or Wheat.

Thirty pounds of the best lump oats or wheat, 2 gallons of water, and ¼ lb. (two sticks) phosphorus. Place the grain in a revolving machine or churn; light a fire close at hand, upon which place two buckets, with 1 gallon of water in each. When the water boils, put ¼ lb. (two sticks) of phosphorus into one of the buckets, and stir slowly for 5 minutes until phosphorus is dissolved. Pour this mixture into the machine and add water from the other bucket as quickly as possible. Close the lid and turn machine slowly for about 20 minutes. If the machine has not been cooled sufficiently to allow the hand to be placed upon it without burning, pour a bucket of water over it, and turn for a few minutes. The machine should be turned for 5 minutes 4 hours after mixing, and also again for the same time 8 or 9 hours afterwards. In 24 hours the mixture should be taken out and spread at once. Give machine a few turns before taking oats out.

Note.—The mixing should not be done in an open boiler, as the phosphorus cannot be incorporated with sufficient quickness and evenness, and the phosphorus generally runs to the bottom. A revolving machine should in all cases be used, and to secure the retention of the phosphorus in the grain it is a good thing to add 1 lb. of starch to each bushel, or coat it with pollard.

Phosphorised oats prepared by this method are deadly for at least two months in winter after they are laid on the ground (the grain being permeated with the poison), and have proved deadly after 10 days' exposure to warm rains and hot winds. Good wheat or oats, good phosphorus, and strict attention to the directions are, however, necessary to insure success.

Grain as a medium is less attractive and not so cheap as pollard; but there are times when a change of medium is called for, and then grain should be tried. Properly prepared and laid grain is not very expensive.

It will be observed that in order that the phosphorus may be thoroughly mixed with and absorbed by the grain (wheat or oats principally) the directions here given require that a revolving machine be provided, and, as this would be beyond the means of the individual owners of the small holdings, they could provide themselves with small circular churns, which do not cost more than 20s. or 30s. They have been used for the purpose, and found to suit where the quantity of grain required was small, and they would also answer for the various mediums which are used with arsenic.

NITRATE OF SODA.

Next to sulphate of ammonia, nitrate of soda is the most costly of artificial fertilisers. Farmers should therefore endeavour to supply this ingredient of plant food to the soil by cheaper means than purchasing it in the form of artificial fertilisers. The use of stable manure is one means; compost is another. The cultivation of crops which gather their nitrogen from the atmosphere, such as peas, beans, cowpeas, maize, &c., is a good means of supply. These may be either ploughed in green or fed to farm stock to obtain nitrogenous manure.

To prevent loss of nitrogen in stable manure, spread potash salts either in the stable, or scatter them at intervals over the manure heaps.

Dairying.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 31st July, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Annie Laurie	Ayrshire	25 April, 1901	856	3·6	34·5	
Blink ...	,, ...	28 Feb. ,,	803	3·8	34·17	
Bonny ...	,, ...	12 April ,,	517	3·6	20·85	
Laura ...	,, ...	28 Aug., 1900	303	3·8	12·89	With first calf
Leesome ...	,, ...	1 Sept. ,,	622	3·8	26·47	
Linnet ...	,, ...	7 May, 1901	1,090	3·5	42·72	
Rosebud ...	,, ...	10 April, 1900	427	3·8	18·17	
Renown ...	,, ...	29 Nov. ,,	387	3·7	16·03	With first calf
Ruth ...	,, ...	8 Oct. ,,	314	3·8	13·36	With first calf
Ruby ...	,, ...	9 April, 1901	440	3·6	18·86	With first calf
Baroness ...	Jersey	3 Aug., 1900	335	5·5	13·13	
Bashful ...	,, ...	2 Nov. ,,	95	5·7	6·06	Dry, 20-7-01
Connie ...	,, ...	8 Sept. ,,	365	5·2	21·15	
Content ...	,, ...	18 July ,,	512	5·0	28·67	
Carrie ...	,, ...	18 Aug. ,,	88	6·0	5·91	Dry, 15-7-01
Effie ...	,, ...	6 Jan., 1901	384	4·8	20·64	
Evileen ...	,, ...	2 Sept., 1900	379	5·2	22·07	
Playful ...	,, ...	14 July ,,	392	4·4	19·31	
Stumpy ...	,, ...	29 Aug. ,,	546	4·2	25·68	
Olive ...	,, ...	4 July, 1901	270	4·5	13·6	With first calf
Cherry ...	Shorthorn ...	11 April ,,	412	3·8	17·53	With first calf
Countess ...	,, ...	18 June ,,	895	3·7	37·08	
Dott ...	,, ...	31 May ,,	560	3·7	23·2	With first calf
Dora ...	,, ...	2 June ,,	471	3·6	18·99	With first calf
Gladdy ...	,, ...	29 April ,,	635	3·8	27·02	
Kit ...	,, ...	28 Sept. ,,	341	3·9	14·78	
Maggie ...	,, ...	20 May ,,	463	3·6	18·66	
Olga ...	,, ...	19 June ,,	522	3·8	22·21	With first calf
Plover ...	,, ...	3 July, 1900	496	3·6	19·99	
Queenie ...	,, ...	19 May, 1901	604	3·6	24·35	
Roany ...	,, ...	17 Mar., 1901	388	3·7	16·08	With first calf
Rose ...	,, ...	10 April ,,	525	3·6	21·16	With first calf
Violet ...	,, ...	9 Oct., 1900	475	3·7	19·68	
Guinea ...	,, ...	18 July, 1901	710	3·6	28·62	
Nestor ...	,, ...	3 July ,,	520	3·7	21·54	
May ...	,, ...	16 July ,,	312	3·7	12·92	
Lady Vixen ...	,, ...	13 July ,,	280	3·8	11·91	With first calf
Alice ...	Grade Shorthorn	13 Nov., 1900	640	3·7	26·52	
Curly ...	,, ,, ...	10 Dec. ,,	170	4·0	7·61	Dry, 25-7-01
Clara ...	,, ,, ...	14 June, 1901	561	3·7	23·24	With first calf
Ginger ...	,, ,, ...	19 Dec., 1900	551	3·8	23·45	
Princess May	,, ,, ...	25 May, 1901	565	3·8	24·04	With first calf
Peggie ...	,, ,, ...	29 May ,,	656	3·6	26·44	
Rosella ...	,, ,, ...	5 Sept., 1900	420	3·6	16·93	
Stranger ...	,, ,, ...	7 July ,,	105	3·9	4·58	Dry, 25-7-01
Grace ...	South Coast ...	15 June, 1901	652	3·6	26·28	With first calf
Trixey ...	,, ,, ...	4 July ,,	511	3·7	21·17	With first calf
Ada ...	,, ,, ...	16 July ,,	254	3·6	10·24	With first calf
Dairymaid ...	Holstein	3 Mar. ,,	740	3·3	27·15	
Damsel ...	,, ...	19 Jan. ,,	728	3·1	25·27	
Pansy ...	Grade Jersey ...	4 Dec., 1900	432	3·9	18·86	With first calf
Lady Rose ...	Guernsey ...	15 April, 1901	533	4·0	23·87	With first calf
Polly ...	Grade Shorthorn	21 Feb. ,,	527	3·8	22·42	
Restless ...	,, ,, ...	3 Sept., 1900	320	3·9	13·97	

The dairy herd grazed on natural pasture and on *Paspalum dilatatum* grass and lucerne, and were hand-fed on green barley.

RETURNS FROM 1ST TO 31ST AUGUST, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat. Babcock Test.	Commercial Butter.	Remarks.
			lb.			
Rosebud ...	Ayrshire	10 April, 1900	230	3·6	9·27	
Leesome ...	"	18 Sept. "	641	3·8	27·28	
Ruth ...	"	8 Oct. "	290	3·3	10·71	With first calf
Laura ...	"	28 Aug. "	416	4·0	18·63	With first calf
Renown ...	"	29 Nov. "	373	3·4	14·2	With first calf
Ruby ...	"	9 April, 1901	517	3·3	19·1	With first calf
Blink ...	"	2 Feb. "	838	3·5	32·84	
Annie Laurie	"	25 April "	935	3·6	37·69	
Bonnie ...	"	12 April "	533	4·2	25·07	
Linnet ...	"	7 May "	1,073	3·6	43·26	
Lass ...	"	24 Aug. "	120	3·6	4·83	With first calf
Baroness ...	Jersey	3 Aug. "	210	5·2	12·23	
Playful ...	"	14 July "	346	4·0	15·5	
Spec ...	"	27 Aug. "	62	4·0	2·77	
Stumpy ...	"	27 Aug., 1900	553	4·5	27·87	
Eveleen ...	"	2 Sept. "	349	5·0	19·54	
Connie ...	"	8 Sept. "	456	5·0	25·53	
Effie ...	"	6 Jan., 1901	402	4·6	20·71	
Content ...	"	6 June "	635	4·8	34·13	
Olive ...	"	4 July "	421	5·0	23·57	
Alice ...	Grade Shorthorn	13 Nov., 1900	602	4·4	29·66	
Clara ...	" " ...	14 June, 1901	527	3·5	20·64	With first calf
Ginger ...	" " ...	19 Dec., 1900	489	4·0	21·9	
Princess May	" " ...	25 May, 1901	611	4·0	27·37	With first calf
Poly Red ...	" " ...	21 Feb. "	637	4·0	28·53	
Peggie ...	" " ...	29 May "	661	3·6	26·64	
Rosella ...	" " ...	5 Sept., 1900	359	3·9	15·68	
Restless ...	" " ...	3 Sept. "	204	3·9	8·91	
Laurel ...	" " ...	22 Aug., 1901	150	3·8	6·38	
Redmond ...	" " ...	22 Aug. "	130	3·7	5·38	
Cherry ...	Shorthorn ...	11 April "	435	3·3	16·07	With first calf
Countess ...	"	18 June "	944	3·6	38·06	
Dott ...	"	31 May "	654	3·7	27·10	With first calf
Gladdy ...	"	29 April "	563	3·8	23·96	
Kit ...	"	28 Sept., 1900	305	4·6	15·71	
Maggie ...	"	20 May, 1901	470	3·7	19·02	
Olga ...	"	19 June "	530	3·3	19·58	With first calf
Plover ...	"	3 July, 1900	460	3·5	18·26	
Queenie ...	"	19 May, 1901	658	3·6	26·52	
Roany ...	"	17 Mar. "	376	3·5	14·73	With first calf
Rose ...	"	10 April "	487	3·8	20·72	With first calf
Violet ...	"	9 Oct. "	548	3·4	20·86	
Guinea ...	"	1 July "	899	3·8	38·25	
Nestor ...	"	3 July "	789	3·5	30·92	
May ...	"	16 July "	815	3·5	31·94	
Lady Vixen	"	13 July "	646	3·7	26·76	With first calf
Dora ...	South Coast ...	2 June "	488	4·3	23·5	With first calf
Grace ...	" " ...	15 June "	738	3·7	30·58	With first calf
Trixey ...	" " ...	4 July "	691	3·3	25·53	With first calf
Ada ...	" " ...	16 July "	808	4·4	39·81	With first calf
Lady Rose ...	Guernsey ...	15 April "	438	5·0	24·52	With first calf
Damsel ...	Holstein	19 Jan. "	689	3·7	28·54	With first calf
Pansy ...	Grade Jersey ...	4 Dec., 1900	375	3·9	16·38	

The cows were grazed for a few hours daily on portions of the cultivated area and *Paspalum dilatatum* grass.

THE DAIRY HERD.

THE PROPERTY OF THE SCOTTISH AUSTRALIAN INVESTMENT COMPANY, LIMITED, TALGAI WEST, *VIA* HENDON.

Returns from 1st to 31st July, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Lily	Holstein	14 May, 1901	1,167	4·4	57·51	Heifer in first calf.
Jean ...	Jersey	30 May ,	775	4·1	35·32	
Victoria ...	,, ...	21 May ,,	793	4·2	37·14	
Jubilee ...	,, ...	19 Nov., 1900	438	5·0	24·78	
Goldenspray	Grade Jersey ...	25 June, 1901	1,185	4·6	61·27	
Scarlet ...	,, ...	15 May ,,	749	3·8	31·55	Heifer in first calf.
Duchess ...	,, ...	19 Nov., 1900	593	4·8	32·12	
Favourite ...	South Coast ...	6 May, 1901	720	3·6	28·62	Heifer in first calf.
Bess	Shorthorn ...	27 May ,,	849	4·0	37·70	
Julia ...	,, ...	15 June ,,	886	4·1	40·33	
Jeannie ...	,, ...	20 June ,,	747	4·0	33·17	Heifer in first calf.
Dora ...	,, ...	12 March ,,	472	4·4	23·26	
Edith ...	,, ...	17 June ,,	929	3·8	39·13	Heifer in first calf.
Trilby ...	,, ...	19 Oct., 1900	452	4·2	21·17	
Countess ..	,, ...	15 May, 1901	718	3·8	30·24	
Cowslip ...	,, ...	13 Oct., 1900	470	4·0	20·87	
Strawberry	,, ...	23 Sept. ,,	437	4·0	19·40	
Noura ...	,, ...	26 Oct. ,,	490	3·8	20·64	Heifer in first calf.
Fortune ...	,, ...	15 Jan., 1901	578	3·8	24·34	
Primrose ...	,, ...	6 Feb. ,,	696	3·8	29·31	
Vanity ...	,, ...	3 March ,,	527	4·0	23·40	Heifer in first calf.
Nessie ...	Grade Shorthorn	13 May ,,	778	3·4	29·10	Heifer in first calf.
Lizzie ...	,, ,, ...	3 May ,,	428	4·2	20·04	Heifer in first calf.
Nellie ...	,, ,, ...	29 April ,,	528	3·8	22·23	Heifer in first calf.
Buttercup ...	,, ,, ...	12 Oct., 1900	450	4·2	21·07	
Dairymaid ...	,, ,, ..	24 June, 1901	791	4·0	35·12	
Jupiter ...	,, ,, ...	26 April ,,	723	3·9	31·27	
Dolly ...	,, ,, ...	16 Jan. ,,	592	4·0	26·28	
Rosette ...	,, ,, ...	26 Oct., 1900	434	4·6	22·38	
Milkmaid ...	,, ,, ...	17 Oct. ,,	479	5·0	27·10	
Jessamine ..	,, ,, ...	16 Nov. ,,	619	4·3	29·74	
Sunbeam ...	,, ,, ...	20 Jan., 1901	490	4·3	23·54	
Majestic ...	,, ,, ...	2 March ,,	686	3·5	26·48	
Bridget ...	,, ,, ...	17 July ,,	276	4·0	12·25	
Madam ...	Grade Ayrshire	13 March ,,	691	3·8	29·10	
McCaffrey ...	,, ,, ...	8 Oct., 1900	330	4·1	15·04	
Mermaid ...	,, ,, ...	23 Jan., 1901	599	4·0	22·11	
Trimmer ...	,, ,, ...	11 Dec., 1900	596	3·2	20·90	
Spec ...	,, ,, ...	31 Oct. ,,	497	3·8	20·93	
Marjorie ...	,, ,, ...	10 Jan., 1901	577	4·0	25·62	
Emma ...	,, ,, ...	21 Mar. ,,	589	3·4	22·03	
Charity ...	,, ,, ...	23 Jan. ,,	554	4·0	24·60	Heifer in first calf.
Victory ...	,, ,, ...	6 July ,,	636	4·0	28·24	Heifer in first calf.
Faith ...	,, ,, ...	15 July ,,	409	3·7	16·72	Heifer in first calf.

Returns from 1st to 31st August, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Lily ...	Holstein	14 May, 1901	938	4·0	41·65	Heifer in first calf.
Jubilee ..	Jersey	19 Nov., 1900	351	4·6	18·15	
Victoria ...	,, ...	21 May, 1901	678	5·2	40·14	
Jean ...	,, ...	30 May ,,	651	4·4	32·08	
Kate ...	,, ...	17 Aug. ,,	207	4·6	10·70	
Duchess ...	Grade Jersey ...	19 Nov., 1900	495	4·7	26·20	

RETURNS FROM 1ST TO 31ST AUGUST, 1901—*continued.*

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat. Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Scarlet ...	Grade Jersey ...	15 May, 1901	654	4·0	29·04	Heifer in first calf.
Goldenspray	,, ...	25 June ,,	1,041	5·4	64·44	
Favourite ...	South Coast ...	6 May ,,	582	3·8	24·51	Heifer in first calf.
Strawberry...	Shorthorn ...	23 Sept., 1900	200	5·0	11·32	Dried off 18th Aug.
Cowslip ...	,, ...	13 Oct. ,,	309	4·2	14·47	Dried off 26th Aug.
Trilby ...	,, ...	19 Oct. ,,	119	5·2	7·03	Dried off 12th Aug.
Noura ...	,, ...	26 Oct. ,,	390	3·7	15·95	Heifer in first calf.
Fortune ...	,, ...	15 Jan., 1901	430	4·0	19·19	
Primrose ...	,, ...	6 Feb. ,,	537	4·0	23·84	
Vanity ...	,, ...	3 Mar., ,,	436	4·2	20·42	Heifer in first calf.
Dora ...	,, ...	12 Mar. ,,	402	4·2	18·82	
Countess ...	,, ...	15 May ,,	589	3·6	23·42	
Bess ...	,, ...	27 May ,,	718	3·8	30·24	
Julia ...	,, ...	15 June ,,	747	4·0	33·17	
Edith ...	,, ...	17 June ,,	834	4·0	37·03	Heifer in first calf.
Jeannie ...	,, ...	20 June ,,	604	3·8	25·44	Heifer in first calf.
Rusty ...	,, ...	17 Aug. ,,	262	4·0	11·63	
Buttercup ...	Grade Shorthorn	12 Oct., 1900	193	5·0	10·92	Dried off 19th Aug.
Milkmaid ...	,, ,, ...	17 Oct. ,,	59	6·0	4·07	Dried off 5th Aug.
Rosette ...	,, ,, ...	26 Oct. ,,	121	5·4	7·49	Dried off 12th Aug.
Jessamine ...	,, ,, ...	16 Nov. ,,	478	4·5	24·14	
Dolly ...	,, ,, ..	16 Jan., 1901	491	4·2	22·99	
Sunbeam ...	,, ,, ...	20 Jan. ,,	385	5·0	21·78	
Majestic ...	,, ,, ...	2 Mar. ,,	571	3·8	24·05	
Jupiter ...	,, ,, ...	26 April ,,	570	3·8	24·01	
Nellie ...	,, ,, ...	29 April ,,	444	3·6	25·15	Heifer in first calf.
Lizzie ...	,, ,, ...	3 May ,,	407	4·0	18·07	Heifer in first calf.
Nessie ...	,, ,, ...	13 May ,,	675	3·6	26·84	Heifer in first calf.
Dairymaid ...	,, ,, ...	24 June ,,	677	4·1	30·85	
Bridget ...	,, ,, ...	17 July ,,	748	3·9	32·35	
Midget ...	,, ,, ...	24 August ,,	150	3·5	5·79	
Spec ...	Grade Ayrshire	31 Oct., 1900	270	4·7	14·29	Dried off 23rd Aug.
Trimmer ...	,, ,, ...	11 Dec. ,,	488	4·0	21·67	
Marjorie ...	,, ,, ...	10 Jan., 1901	489	3·9	21·15	
Mermaid ...	,, ,, ...	23 Jan. ,,	462	4·0	20·51	
Charity ...	,, ,, ...	23 Jan. ,,	443	4·1	20·19	Heifer in first calf.
Madam ...	,, ,, ...	13 March ,,	512	3·7	20·94	
Emma ..	,, ,, ...	21 March ,,	480	3·5	18·53	
Victory ...	,, ,, ...	6 July ,,	720	4·1	32·81	
Faith ...	,, ,, ...	15 July ,,	760	4·1	34·64	Heifer in first calf.
Promise ...	,, ,, ...	26 July ,,	819	3·7	33·49	

AUBIN DOWLING, Manager.

MILK TESTS AT BEENLEIGH SHOW.

29TH AND 30TH AUGUST, 1901.

FIRST DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. T. McEvoy... ...	Biddy	19	3·9	·82
	Mr. H. Marlow	Garnet	$11\frac{3}{4}$	2·4	·31
	Mr. J. Waldron... ...	Strawberry ...	$14\frac{1}{2}$	4·2	·68
	Mr. J. Waldron... ...	Plum	$10\frac{3}{4}$	4·2	·50
Evening.	Mr. T. McEvoy	Biddy	$13\frac{1}{2}$	4·0	·60
	Mr. H. Marlow	Garnet	$10\frac{1}{4}$	3·8	·43
	Mr. J. Waldron... ...	Strawberry ...	11	4·6	·56
	Mr. J. Waldron... ...	Plum	$8\frac{1}{2}$	4·4	·41

MILK TESTS AT BEENLEIGH SHOW—*continued.*

SECOND DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. T. McEvoy... ...	Biddy	17¼	3·7	·71
	Mr. H. Marlow	Garnet	11¾	3·8	·50
	Mr. J. Waldron... ...	Strawberry ...	15¾	3·9	·68
	Mr. J. Waldron... ...	Plum	12¾	3·8	·54
Evening.	Mr. T. McEvoy... ...	Biddy	17	...	3·4
	Mr. H. Marlow	Garnet	...	...	...
	Mr. J. Waldron... ...	Strawberry ...	11½	...	4·4
	Mr. J. Waldron... ...	Plum	9	...	4·2

Respective Totals of Commercial Butter for Two Days.

	Biddy.	Strawberry.	Plum.	Garnet.
First Day	1·42	1·24	·91	·74
Second Day	1·35	1·24	·96	·50
Total	2·77	2·48	1·87	1·24

AN IMPROVED BUCKET-HOLDER.

We (*Adelaide Observer*) have from a Korumburra inventor the improved milking bucket-holder shown in the accompanying illustrations. By means of the dented tongue (*a*) the strap surrounding the bucket can be let out or taken in to suit any size of milking bucket. The holders or knee straps (*b*), which constitute the chief feature of the device, are placed at a distance apart deemed convenient for the average milker. The small hook (*c*) is so contrived that it will automatically adjust itself, and clamp firmly on the rim of the bucket, thereby preventing the circular hoop (*d*) slipping from the body of the pail. It is claimed for this invention that it does away with the necessity for gripping the bucket with the knees, thereby leaving the milker free to hold the

legs in any other convenient position desirable, also admits the milker assuming an upright position, instead of having to stoop; while, further, it prevents the bucket getting soiled by contact with the ground in cases where the milkers, as in the spring time, unable to bear the strain required, rest the pail on the ground. The dented tongue, it is stated, should be so placed that it is on the side of the cow and away from the milker.

RIPENING CREAM.

A method of ripening cream has been invented by an eminent Danish bacteriologist, Mr. A. Zaffman. The cream is directly fermented with a pure preparation of bacteria, which causes all cream to sour in such a way that the butter obtains the very best taste and flavour, and enables it to keep fresh for a long period. By this new method of ripening the cream direct, it is said to be possible absolutely to prevent any deterioration in the butter from one day to another.—*Engineer.*

A ROUGH METHOD OF TESTING BUTTER SAMPLES.

Procure a few ordinary glass tubes from your chemist, costing, perhaps, ¾d. each. Introduce into each an equal quantity, or thereabouts, of the butters to be tested, and insert them all in boiling water. After thoroughly heating, which causes the fat to melt, leave the tube undisturbed for a time, and then take them out and compare them with each other. The fat, being the lightest, collects in the top of the tubes, next will come a whitish layer of caseine, or curdy matter, and lastly, as the water is heaviest, we find it as the bottom layer. Now some butters contain more water and caseine than others. It may be taken that the less caseine and water present generally the better the butter. If a large proportion of caseine be present, the butter does not keep so well. Excess of water, of course, means that water is being passed off and sold as butter, when it ought not to be. The aim of the butter-maker should be to minimise the proportion of caseine, but not to wash the butter for this purpose too much, which would be done at the expense of the flavour.—*Cable.*

THE WATER HYACINTH PEST.

We have received from Mr. Walter Draper, Superintendent of the Government Gardens at the Barrage, Egypt, the following interesting notes on the destruction of the water hyacinth. He says:—It is perfectly hopeless to attempt the destruction of the pest during the growing season. Waterways may, of course, be cut through for navigation, but cutting only assists its propagation, and the danger of infecting clean districts by floating plants is very considerable. Nothing but a serious outlay, coupled with a thoroughly systematic plan of destruction in the control of competent hands, will clear your State of the pest; and the longer the delay, the greater will be the difficulty and cost of eradication. From personal observation in Egypt, I find that one plant will cover ten times its area during one growing period. In my opinion, the best time to operate in its final destruction is during the season when the plants are dormant—when every hundred plants then destroyed means a thousand less in the following year. The technical part would be in preventing cleaned districts from again becoming infected, which would mean labour lost, as red spider cannot be trusted to do the work.

Mr. Draper kindly offers to furnish a report on two practical methods by which he thinks the pest might be cleaned out of the State.

We cannot depend upon floods or freshes for removing masses of hyacinth, such as once occurred in the Upper Brisbane River. Besides, the pest has in many parts spread over the roadside watertables and into paddocks and waterholes not reached by floods. Any scheme for its removal will, therefore, be gladly welcomed, and we shall await with much interest Mr. Draper's promised report.

The Horse.

DISEASES AND DISORDERS OF THE ALIMENTARY SYSTEM.

By WILMOT C. QUINNELL, M.R.C.V.S. Lond.

DIARRHŒA AND SCOURING.

Definition.—This is a term usually applied to all cases of simple purging—a frequent discharge of fæces in a loose and liquid state. It is met with as a functional disturbance of various nature, or as a sign in the course of general disease.

Causes.—Some horses that are not well "ribbed up," and those of a nervous temperament, are particularly prone to diarrhœa; they are accordingly difficult to maintain in condition, but will sometimes do very well if kept on good food and at slow work.

Perhaps of all causes of diarrhœa, the most frequent in the adult animal is injurious and irregular dieting. If the food is suddenly changed, for instance, when a horse is first turned out to graze after indoor feeding, diarrhœa often starts. Again, copious draughts of cold water, when the animal is heated after exposure to the sun's rays or exertion; feeding immediately after severe work; exposure to cold; an overdose of physic; and the shedding of the temporary molars may be mentioned as specially liable to induce diarrhœa.

Diarrhœa, accompanied with gradual wasting, in a colt or filly is, as a rule, due to small red worms, and the dung should be carefully searched for these special parasites. Diarrhœa or scour in foals is, in some instances, traceable to the fact that the mare is taken to work and allowed to get over-heated, with the result that the milk is altered in its constitution. Again, when the mother returns to her foal at night, and the latter, after doing a long fast during the day, drinks in excess, and therefore more than it can well digest.

Symptoms.—The symptoms are purging, the fæces being semi-fluid, and either clay-coloured and fœtid or light-brown without offensive odour. If the condition continues long, the animal loses flesh, the appetite fails, and sometimes dropsy of the belly may ensue.

In the young, diarrhœa differs from that of the adult. Many foals suffer from diarrhœa or scour during the first two or three weeks of life, and numbers die annually through it. The colour of the excretions varies; at first they are of a yellowish-white colour, and frequently they resemble the yolk of egg; and in more advanced stages, when there is also severe abdominal pain, the fæces passed are acrid. Further, the foal ceases to suck and loses flesh rapidly.

Treatment.—A mild aperient (as linseed oil) will be found sometimes to act very well, more especially if the purging is produced by some irritant in the intestines. In most cases such laxative medicine and a change of diet are all that is necessary to effect a cure. If the bowels do not regain their normal condition after the action of the aperient has subsided, it will be found necessary to use very cautiously some mild restorative (as prepared chalk, combined with opium); and, if the animal is very weak, a moderate amount of alcoholic stimulant, as port wine or brandy, or repeated doses of nitric ether should be given. If this treatment is found to be unsuccessful, powerful astringents must be administered, such as catechu. Oil of turpentine and opium, beaten up with eggs, has been found to be very useful in many cases.

The animal should be allowed flour-gruel to drink. Starch and wheaten flour make excellent gruels, and are of service in most cases of diarrhœa. The horse should be kept as quiet as possible and warmly clothed.

To horses predisposed to scour, water should be given frequently and in reduced quantities, and in winter the chill should be taken off by mixing it with a little warm water. Perhaps the best plan is to leave water always before such horses, because when so supplied they drink less than when watered at intervals. A diminished quantity of water taken into the system by lessening the secretions of the intestines decreases the tendency to purgation. Horses disposed to scour should be stinted of their water before going to work. Some horses will scour, unless a little hay is given to them in the morning before they are watered.

Treatment of Diarrhœa in the Young.—Whatever be the cause, it is well to commence the treatment with a laxative. Four tablespoonfuls of castor oil and $1\frac{1}{2}$ drachms of chlorodyne is a suitable mixture for such purposes.

When weakness is marked, a little alcoholic stimulant may be administered—for instance, four tablespoonfuls of brandy beaten with four eggs, say every three hours.

Pepsin, five to ten grains, together with twenty minims of diluted hydrochloric acid, given twice daily, is recommended as a very useful mixture for scour in young foals that are suckling.

In addition to the foregoing treatment, the dam may be given a dose of laxative medicine.

COST OF BECOMING A VET.

A young fellow wrote to the editor of an English journal lately asking him to let him know the cost of becoming a veterinary surgeon. This was the reply:—When I told a certain eminent professor that I had a son I was going to make a vet. of, he replied, "Why not drown him?" However, it is not of the prospects of the vet. profession you ask, but how to enter it. The first thing essential is a liberal education, as a preliminary test or matriculation examination is required as proof of the student's capacity for the assimilation of knowledge. This debars many a good man from entering, but is a cruel kindness in preventing youths with no ability from embarking on a career in which they cannot hope to succeed. It is the equivalent of that prescribed by the General Medical Council, and in Scotland the certificate of the Educational Institute is accepted (arrangements are being made for that institution to hold similar examinations in England and Ireland). Latin and at least one European language are among the subjects. After taking this, the first fence, successfully, you have to spend a minimum of four years at college—a fall at either of the succeeding obstacles delays the pass examination. The entrance fee of 80 guineas needs to be supplemented with £20 worth of books, microscope, instruments, &c., &c. (there is a lot of "&c , &c."), and the cost of maintenance in London, Edinburgh, Glasgow, or Dublin during the years named. A Scot, accustomed to severe self-denial, may do it for £300, but the average student needs something like £500 from first to last if he is to have a decent time of it. If you write to the Dean at either of the colleges, you will have forwarded to you a book of rules, giving you the fullest details, but rather calculated to frighten beginners, and therefore not such a fetching advertisement as the compilers intended it to be. The profession is not likely to be overcrowded, as the rush is past and the red light visible. Other means of traction than that of the horse are frightening parents unduly, and those who enter the profession now will probably not regret it. For myself, I would rather practice as a vet. than earn double the income in any other calling.

Poultry.

A QUEENSLAND DUCK FARM.

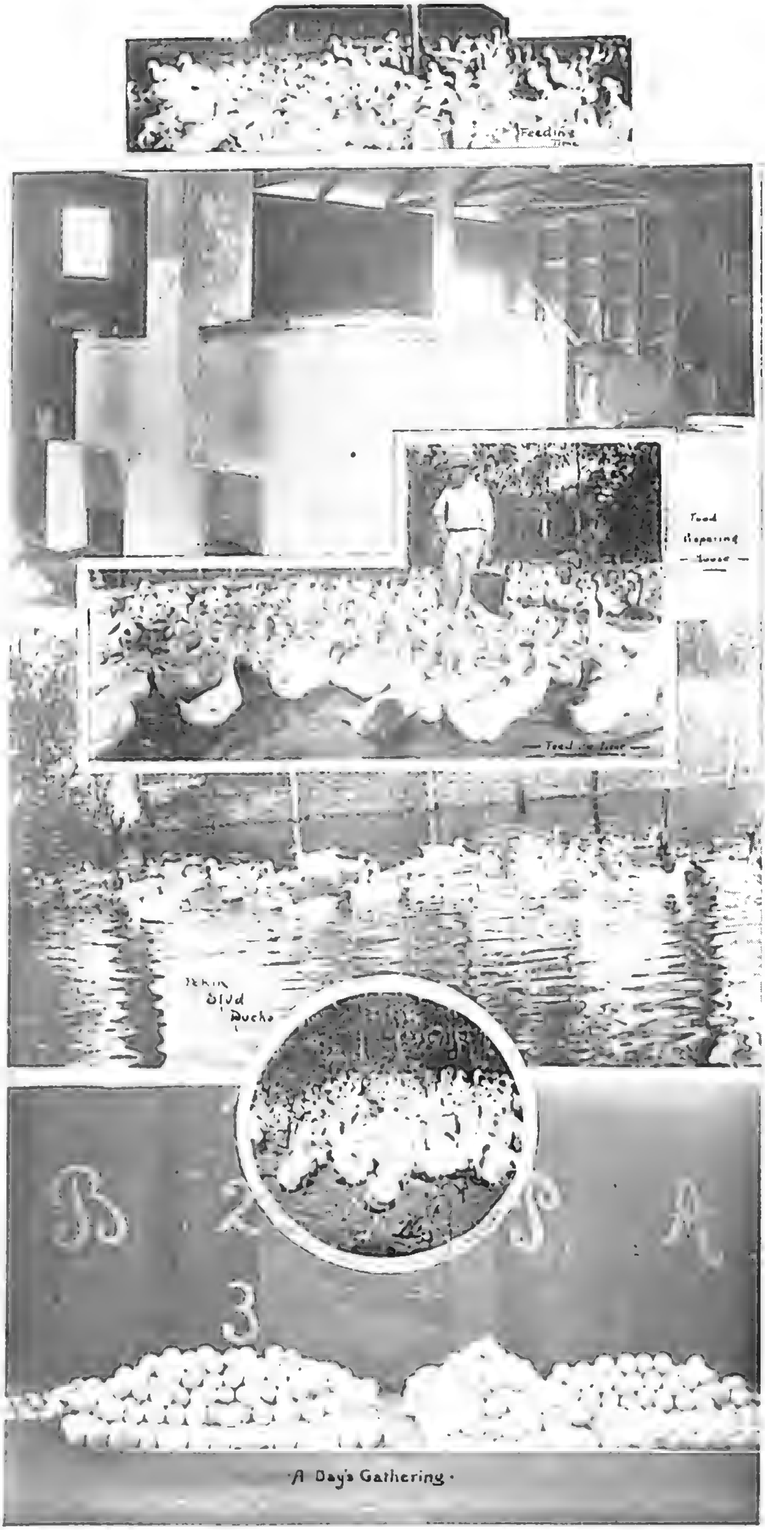
It is no less remarkable than true that people very often know more about what is passing in other States and countries than about what is going on at their own doors. A case in point is the establishment of a large duck farm at their Belmont fellmongery by Messrs. Baynes Bros., of South Brisbane and Queensport. This enterprising firm some time ago visited the immense duck farm of the Messrs. Ellis at Botany, New South Wales, and were not long in arriving at the conclusion that a most profitable export business could be done in this line in connection with their other export operations. The result was that they set quietly to work and prepared some 10 acres of their large Belmont property for utilisation as a duck farm on a large scale. Sceptics, mindful of the non-success of poultry farms, doubted the wisdom of this venture, but the Messrs. Baynes are too shrewd as business men to enter upon any line which has not been thoroughly thought out and studied from all points of view. Consequently they imported a number of the best breeds of stud ducks from the South, placed a reliable expert in charge, and the result has been so satisfactory that the operations are being continued on a larger scale. Last month, at Mr. Ernest Baynes' invitation, we paid a visit to the farm, which is situated some 6 miles from the city on what is known as Doughboy Creek. The land is excellently situated for the purpose, having plenty of gently sloping knolls and an abundant supply of fresh water. Part of the land is occupied by their fellmongering establishment, and part by a pig farm, where there are about 3,000 well-bred pigs, principally of the Berkshire type.

At present, 10 acres have been apportioned to the duck farm. Here the necessary buildings have been erected, and yards and runs fenced off. None of the dividing fences are over 2 feet in height, as the ordinary ducks never think of flying over any low obstruction. The Muscovies, however, will take long flights, and these are provided for in runs with high wire-net fences. These also, as well as the stud Pekins, have full liberty to swim in a broad stretch of the creek, although confined between wire fences. The remainder have a small area of water fenced off for them, where they have just room to take a bath; and this portion can be closed against them when necessary. The ducks intended for sale are not allowed to enter the water at all, neither are the ducklings permitted the luxury of a swim. In each yard there are drinking-troughs and a feeding-floor. This floor is about 3 inches high, 8 feet long, and 3 feet wide, cemented, with no raised sides. The food is scattered on this, and, when feeding time is over, it is carefully swept clean. No sloppy food is given. In the shed devoted to preparing food, there are two boilers for boiling liver, wheat, barley, pumpkins, lucerne, and other vegetable matter. Pollard and oat-dust are fed dry. The liver is cut into small pieces, and the whole is mixed in a large trough, with a certain proportion of sand. When ready for use, this mixture contains very little moisture. It is exceedingly nutritious and fattening, as is evidenced by the abnormal size of the birds, which look far more like geese than ducks. The majority are of immense size. The different varieties are kept separate. There are Aylesburys, Pekins, Muscovies, and a new breed not before seen in Queensland, called Buff Orpingtons. There are, as yet, only a few of these, which are valued, as a novelty, at 2 guineas each. They are large, handsome birds, with buff plumage and heads. As yet, there are no Indian Runners, but these are to be shortly added.

Plate XIII.

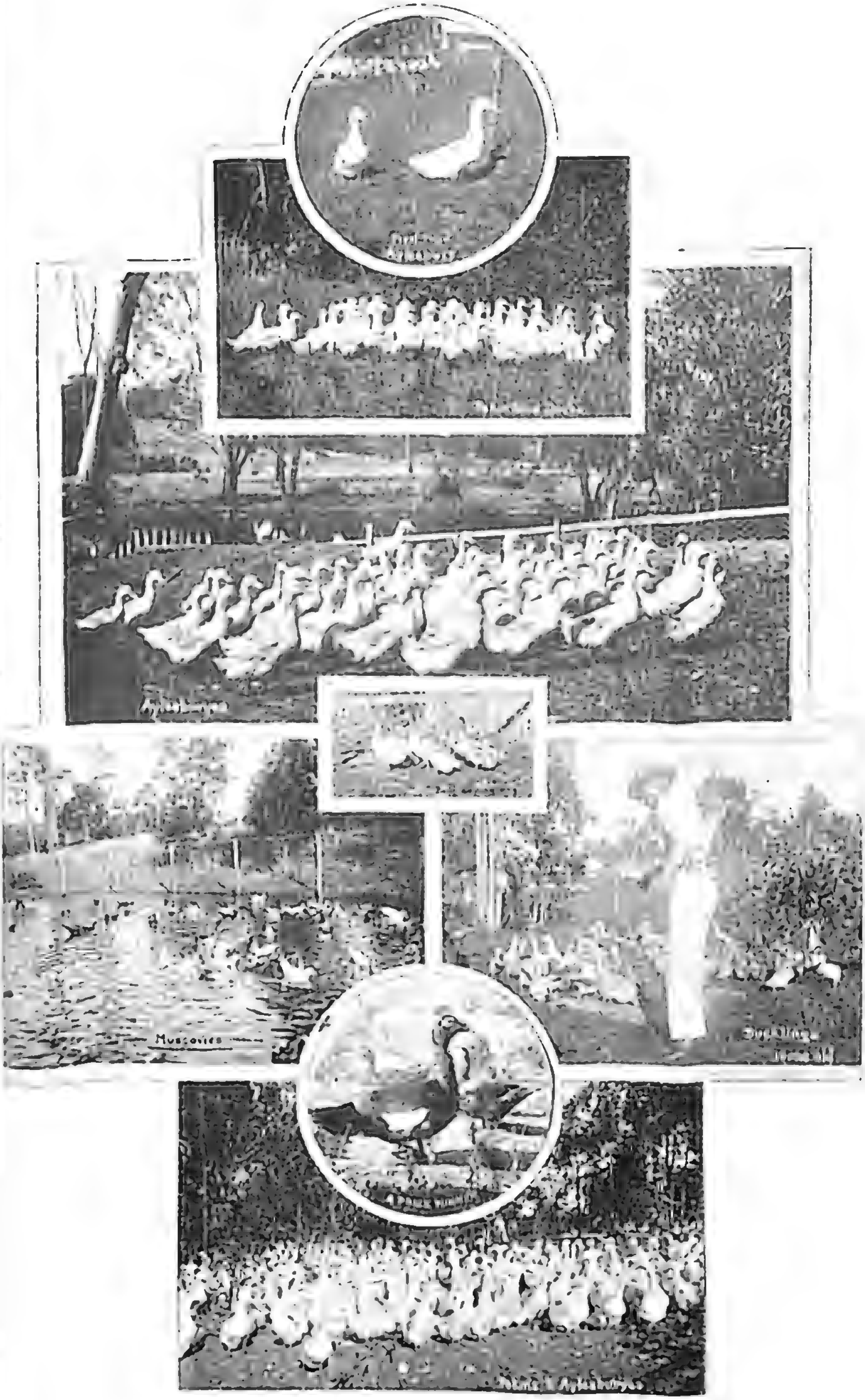
Belmont Duck Farm.

Plate XIV.



BELMONT DUCK FARM.

Plate XV.



Belmont Duck Farm.

Having seen the process of preparing the food, we next visited the incubating-house. Here there are sixteen incubators of different sizes, varying from a capacity of 100 to 400 eggs. They consist of the Prairie State, the Wooden Hen, Eclipse (by Ellis and Dobeson), Excelsior, and Petaluma. All these are self-regulating. In these incubators there were some 3,000 eggs, in all stages of development, in a temperature averaging 103 degrees. In some, the young ducklings were just emerging, their late lodgings being "to let." In others, the birds could be seen by the aid of the egg-tester wriggling about in their narrow quarters, whilst in others again the head, heart, and membranes of the forming chick could be clearly seen. The most exquisite cleanliness is observed here as elsewhere, and it was justly observed that there is more mess visible in a town allotment enclosing fifty hens than was to be seen in any part of this farm of 3,000 birds. From the hatching-room the ducklings are passed on to their foster-mother in the "nursery."

This nursery is divided into ten roomy pens about 10 feet long by 8 feet wide, with cemented floors covered deeply with clean hay. At the head of each pen is a wooden chest with glass doors opening onto a passage at one side and onto the pen at the other. These chests are the foster-mothers, and are warmed by a lamp placed underneath, by which they are kept at a temperature of 85 to 90 degrees. Each pen has a feeding-trough surmounted by something like a toast-rack, into which the ducklings can put their heads to feed, but cannot get in and spoil the food. The water-troughs are covered with wire-netting through which they can get their bills and heads only. For twenty-four hours after hatching, the ducklings are allowed no food. After that, they are regularly fed eight times a day. There is a door to each pen, opening upon the nursery run, in which the little birds bask in the sun. Each pen is devoted to ducklings of a certain age. As they grow, they pass from pen to pen, until in about five weeks they are promoted to the large outer yards. In all, there are here sixteen runs and yards, and beyond the creek are two large yards for Muscovies and Pekins.

Another range of duck-houses is being built higher up the hill, and an experiment is being made with "ruberoid" for the sides and roofs. Each of these houses is provided with a fairly large run enclosed by a low wire-net fence. There are no nests. The ducks lay their eggs during the night all over the laying-yards, and they are all collected by sunrise in the morning. Our illustration shows part of a morning's collection. The whole is under the care of Mr. William Grave, who, eight years ago, was a student at the Hawkesbury College, New South Wales, and who not only thoroughly understands his business, but is a perfect enthusiast in the work. A very short inspection suffices to show that he is the right man in the right place. Compared with poultry, ducks are comparatively free from disease, consequently a duck farm will pay the owner when a poultry farm might not prove successful.

It is intended to bring the numbers up to 10,000, and then to commence exporting.

Pigeons are about to be bred in large numbers in extensive aviaries. They require little attention, breed freely, and are a source of considerable profit.

Our illustrations are from photographs taken by Mr. F. C. Wills, artist to the Department of Agriculture.

This is what *The Field* has to say on poultry farming:—There has recently come under our notice the prospectus of a proposed new poultry company, with a capital of £10,000 in shares of £1 each. It sets forth that the company is formed for the purpose of cultivating poultry farming in all its various branches, and states that under suitable conditions it is a very lucrative industry. If the promoters of this company had called attention to one single example of a profitable poultry farm, they would have done much more to recommend their scheme than by publishing general statements of this kind. We have never been able to discover the existence of a poultry farm which has been carried on for two years with success. The allusion to the large number of eggs and

the quantity of poultry that is imported into this country is fallacious and misleading. There are no poultry farms on the Continent. The eggs and fowls are produced, as in this country by the cottagers and small proprietors, collected and imported. If a large number of fowls are kept on the land it becomes tainted, and disease inevitably breaks out. Poultry, as Mr. Rider Haggard had the candour and honesty to say in the balance-sheet of his farm, cannot be made to pay where rent has to be paid for land. Poultry produce is only a by-product. Fowls are profitable where they have no rent to pay, and where they eat up the waste of the farm, but have never yet under any circumstances been made to pay as a separate industry. Breeding fancy poultry and selling them at fancy prices is quite another pursuit, and it cannot be carried on on an extensive scale. The only large establishments that are profitable in connection with poultry are the fattening establishments, which constitute a totally distinct industry. The chickens, collected mostly by the higglers, are fattened in hundreds; they never set foot upon the ground, being at once transferred to the fattening pens and allowed to feed, and finally crammed until sufficiently fat for the market.

FARMERS' POULTRY IN 1800.

In Arthur Young's *Farmers' Calendar*, published in 1803, there occurs this reference:—Mrs. Boys, who is as intelligent in her walk of management as her husband is in his, conducts her poultry with greater success than any person I have met with. While I was at Betshanger, a higgler's cart carried off above twelve dozen fowls for one draught. Enquiring what could be the process that commanded such plenty, I found it so simple as to be explained in a moment. The labourers' wives and families who live on Mr. Boys' farm do the whole. He supplies them with what offal corn is necessary, and they return Mrs. Boys the grown fowls ready for market at 3d. each, 6d. for turkeys and geese, and 3d. for ducks, and her accompt, well kept, states a profit of £20 a year after all expenses paid and the family well supplied; they have also all the eggs without any payment. It answers as well to the people as it does to the farmer. A fat turkey 21 lb. alive is 14 lb. dead, and there were farmers who, on this plan, reared and sold 140 turkeys per annum.

In those days only eight breeds were known. They were dunghill fowls, game, Dorkings, Poland, bantam, Malay, shackbag, and Spanish. Now we have something like forty separate breeds, with a host of varieties of those breeds. A hundred years ago Leghorns were unknown. Now there are seven varieties of the breed. Incubators, brooders, and cramming machines were unknown. The demand for eggs and poultry has enormously increased during the century, and hence many attempts have been made to establish large poultry farms, but few have proved successful. Forty or fifty good fowls will, under suitable conditions and management, usually prove profitable, but, as soon as hundreds are kept, the profit vanishes, and the business does not afford the same prospect of success as when poultry are kept as an adjunct to agriculture. Geese and turkeys especially require a great deal of room. If they are kept in confined areas they soon taint the ground, and diseases are not long in making their appearance. At the same time turkeys might be reared in far greater numbers, especially above the Range, than is the case at present, and there is always a good market for them. Most farmers have fairly large areas of land over which a flock of turkeys might be run with great advantage, especially as they are very useful in keeping down insect pests of various kinds. Geese and ducks might be reared in great quantities on the large farms, and would afford employment, amusement, and considerable profit to the female members of the household. But to crowd large numbers of any class of bird on limited areas and town lots means simply courting disaster.

PRESERVING EGGS.

Excluding Air.

The substances suggested and the methods tried for excluding air conveying micro organisms to the eggs, and for killing those already present, are very numerous. An old domestic method is to pack the eggs in oats or bran. Another consists in covering the eggs with limewater, which may or may not contain salt. The results obtained by such methods are not by any means uniform. Some twenty systems were recently tested in Germany, the eggs being kept for eight months. In the result only three lots of eggs were found to be all good—viz., those which were varnished with vaseline, and those which were preserved in limewater or in a solution of water glass. Of these three, preservation in a solution of water glass is especially recommended, since varnishing the eggs with vaseline takes time, and limewater sometimes communicates a disagreeable odour and taste.

Several other methods have been tested in various countries. In Canada it was found that when packed in bran infertile eggs kept better than fertile. German experiments with brine yielded inconclusive results: in some cases the eggs so preserved were quite good, but in other instances the salt penetrated the eggs.

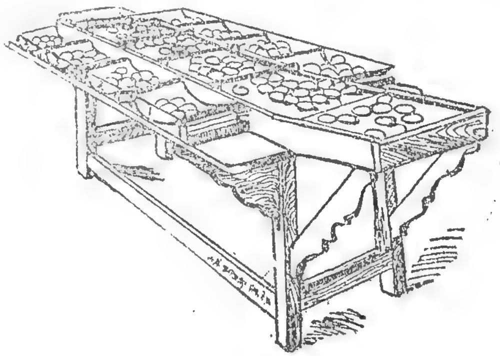
Preserving in Water Glass.

The preservation of eggs in water glass has often been tested of late in the United States, particularly at the North Dakota Experiment Station. Water glass or soluble glass is the popular name for potassium silicate, or for sodium silicate, the commercial article often being a mixture of the two. It is sold in two forms—as a syrup, of about the consistency of molasses, or as a powder. According to the results obtained in North Dakota, a solution of the desired strength for preserving eggs may be made by dissolving 1 part of the syrup in 10 parts, by measure, of water. If the powder is used, a smaller amount is required for a given quantity of water. The water glass offered for sale is sometimes very alkaline; such material should not be used, as the eggs will not keep well in it. Only pure water should be used in making the solution, and it is best to boil it and cool it before mixing with the water glass. The solution should be carefully poured over the eggs packed in a suitable vessel, which must be clean and sweet; and if wooden kegs or barrels are used, they should be thoroughly scalded before packing the eggs in them. The packed eggs should be stored in a cool place; if they are placed where it is too warm, silicate is deposited on the shell and they do not keep well. It was found best not to wash the eggs before packing, as this removes the natural mucilaginous coating on the outside of the shell. One gallon of the solution was found to be sufficient for 50 dozen eggs if properly packed. It is stated that the shells of eggs preserved in water glass are apt to crack in boiling, but that this may be prevented by puncturing the blunt end of the egg with a pin before putting it into the water.—*Farmer and Stockbreeder.*

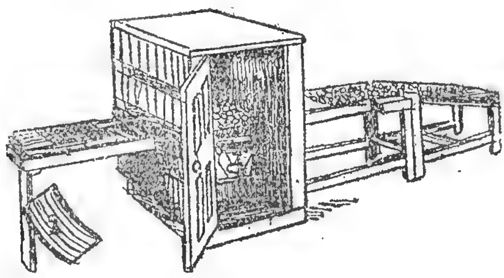
THE BELGIAN EGG TRADE.

Belgium (writes the *Cold Storage Journal*) is a small country, having an area of 11,373 square miles, with a population of 23,895,413, and on the increase, so making one of the most thickly populated countries in the world, while 67 per cent. of the soil is under cultivation, 17 per cent. being under forest. No country offers a better example of the value of small holdings inland, inasmuch as the average farm does not exceed one hectare, or about $2\frac{1}{2}$ acres. Every means is utilised to improve agriculture by a system of education at experimental stations, with the result that the produce from the land is yearly on the increase in the markets of Europe. England takes about one-quarter of the exported products of the country. The more

prominent items on the list of articles we receive from Belgium are eggs, pork, potatoes, and sugar. Strange to say, butter figures very low down on the list, and, compared with a country like Denmark, is hardly appreciable. This, however, is easily understood when the population of Belgium itself is taken into account and the requirements of the people. A feature of the export trade is the use of cold storage in central depôts (La Fermiere), where everything is handled upon the latest and most economical labour-saving principles. The accompanying engravings show two of the appliances used in egg sorting



and grading. The egg chambers are thus described:—The process with the eggs is very carefully carried out. First of all, when the eggs arrive, they are inspected quickly by means of an egg-testing machine. One of these machines is installed in a separate chamber close to the egg chambers, and can be worked up to a capacity of 1,400 eggs inspected in three minutes. These machines measure over all 13 feet long by 7 feet high, and consist of a frame fitted with an endless moving carrier propelled by hand. The carrier is constructed of bobbins fitted closely together, and lined with cloth, thus affording an accurate hollow into which to place each egg. The centre portion of the frame is covered with a dark cabin, through which the endless carrier is moved. Beneath the carrier at the portion which traverses the cabin is a powerful lamp or electric light, and as the eggs are passed over this the bad ones are easily detected by their dark colour or spots. The eggs are fed on



trays to the machine, and the process of inspection is exceedingly rapid. When the eggs have been inspected they are packed in cases of from 300 to 500, the smaller package being preferable for convenience of handling. The cases are first taken into the outer egg store, where they are reduced to a temperature of about 33 degrees Fah. They are then carried into the large egg store, and kept there until the time comes for their removal. This general store is kept at a temperature of just below freezing. An important point to watch in the storage of eggs is the humidity. This is

determined by means of a hygrometer and hygrometer tables. The percentage of moisture in the atmosphere should not vary. In the construction of the cold rooms it has been arranged that there should be a large air lock or lobby. This prevents any contact between the air of the chambers and the outside atmosphere—a very important point, inasmuch as the cold air of a chamber will simply roll out like water unless some barrier like an air lock is there to prevent it. The doors opening to the air lock are never open at the same time as the doors of the chambers when the latter are in work. In the egg-grader, as represented in the second figure, the eggs are separated prior to being packed into four different sizes. The best are those which are too large to go under the first bar on the middle of the table; the second grade stop at the second bar, and so on. As each egg fails to go further under the bars it is lifted out into its proper curved apartment at the side, from which the packers take the eggs when filling the boxes.

CAUSE OF SOFT-SHELLED EGGS.

The laying by hens of thin-shelled eggs is a sure sign that the birds require lime. Some foods, such as oats and other grains, along with which the husk is fed, supply a considerable quantity of phosphate of lime, and thus help to make up for the quantity of this material required by the birds for producing the shells of the eggs laid by them. Other foods, however, such as potatoes and roots of various kinds, supply but little of this material, and when birds are fed upon them to any extent lime must be obtained through some other source. Where birds have liberty, and can roam about a farmyard at will, they usually pick up a sufficiency of lime for themselves, but where they are confined to small enclosures, and if they have no opportunity of obtaining the necessary supplies of this material, arrangements must be made for supplying it. A small heap of builder's rubbish or of mortar thrown in a corner will be found one of the most effective and economical ways of supplying the necessary lime in cases of this kind. Some poultry-keepers supply the lime required by the birds in the form of broken shells and crushed bone, and very excellent both are, because, in addition to supplying lime, they also help the digestion of the food in the crops of the birds. The only objection to them is, they are a little more expensive than the mortar rubbish already referred to.

SULPHUR AND ITALIAN PRIZES.

The following, bearing date of Frankfort, 14th June, 1901, has been received from Consul-General Guenther:—German newspapers report that the agricultural societies of Italy will pay a prize of 1,000 lire (193 dollars) for a reliable method of ascertaining the quality of sulphur and of mixtures of sulphur and sulphate of copper. It is pointed out that the use of sulphur against diseases of plants has increased very largely, but that very frequently the quality of the sulphur, as well as that of its mixture with sulphate of copper, is very inferior. The prize essays must be transmitted up to 1st March, 1902, to the main office of the Federazione Italiana dei Consorzi Agrari, at Piacenza. The award will be made by a special committee. Competition is entirely international.—*California Fruitgrower.*

The Orchard.

KILLING FRUIT FLY.

By S. C. VOLLER.

Some, at least, of the delegates who attended the Agricultural Conference in Warwick in June, 1900, may remember that in connection with the discussions which took place on the subject of fruit culture, the writer of this article described how very successful results had been obtained on his own place by catching the fruit fly with a light butterfly net.

The statement was made that in the course of a few weeks a couple of thousand fruit flies had been caught and killed, and that the undoubted result of this was the satisfactory checking of the attack on the fruit, and, further, the successful marketing of the fruit. This statement went out to the world when the deliberations of the conference were published, and as a result the author of it came in for a good deal of "chaff" from one and another who did not believe in the idea; and in one case a somewhat sneering criticism was put into print.

In spite of criticism and chaff, however, the notion is a good one, and well worthy the attention of fruitgrowers, who need to use *every* means at their command to stop the fly.

There is no doubt that, if we do not beat him, he will beat us. Every means within reason should be used to this end.

Some growers recognise this fact, and I was very agreeably surprised the other day on receiving a letter from a fruitgrower which supports me in my position.

As a possibly interesting bit of reading for those who read the *Journal*, and as a help also to the fruitgrower, I will state what he says, more especially as he has given his permission for this.

This is a copy of his letter:—

Ark Orangery,
Howard, 24th July, 1901.

S. C. Voller, Esq.

Dear Sir,—When you were here about two years ago you told me often of your catching a large number of fruit flies in your orchard just prior to the fruit getting ripe.

Though I did not altogether disbelieve you, still I felt sure that some mistake must have been made in your counting.

You also mentioned that you were not troubled with the fly that year. (This latter remark refers to the time of marketing.—S.C.V.)

I have often thought of trying the idea myself, and last year I offered 2d. per dozen for all flies caught and delivered to me. In the course of a week I thought I should be ruined, as the flies were coming in very freely, and on several occasions I had to pay 4s. 6d. or 5s. for a day's flycatching, and these only caught in the dinner hour or on Sundays. I kept count of the number, and before the oranges were quite ripe I had upwards of 2,000 flies.

I paid over 30s. hard cash for these wretched pests, and thought what a fool I had been, but fortunately I reaped the benefit of it, as I had few, if any, flies at my oranges right through the season, and intend to follow up this business early next year.

If you could urge every fruitgrower to do likewise, I think it would very soon thin out, if not exterminate, the fly.

I am, &c.,
NOAH RICHARDS.

The above is the letter of a practical man whose orchard is far too valuable to be allowed to go under to the fruit fly, or any other pest, and I earnestly urge others to go and do as he has done.

I may state that it is not always necessary to use the net for catching the flies.

This can often be easily done by placing the fingers under the fruit and bringing the thumb down flat on the fly, but it wants doing gently.

The idea of using trap trees for the flies must not be forgotten; that is, certain odd trees of some variety which, by ripening early, or by reason of some other characteristic, may prove a special attraction for the fly.

This often occurs, and the flies will be found to stick to such trees as long as the fruit is there, and they can be caught in numbers.

While writing on this subject, I would like to say that, to my mind, the best means of working against the fly which has yet been discovered is that so constantly advocated by Mr. Benson and myself—viz., the gathering and destruction of all dropped and infested fruit. How long will it be before fruit-growers, both large and small, come to realise that this is the surest way of coping with this dreadful trouble?

Remedies are asked for, and of course will prove more or less useful, but while we clamour for a cure, we go on breeding the pest, and more cure, and more cure again will be wanted.

Boil your infested fruit for a couple of minutes, and you kill the maggots. Kill these, and you have stopped the future fly, and all the swarms that might come from it.

I hope careful attention will be paid to this matter as the early fruits come in this season.

PICKING OLIVES.

Although the olive tree thrives well and fruits heavily in this State, yet, until some cheap way of gathering the fruit is discovered, the manufacture of olive oil on a large scale will be long deferred. In Calabria, in Italy, where there are very extensive olive groves, the proprietors dig out a kind of huge saucer round the trees, about a foot deep towards the centre, sloping up to the surface. The ripe olives, as they drop from the trees, roll down the sides of the depression, and are daily shovelled out with wooden shovels. Some such process might be found to dispose to a certain extent of the labour difficulty in Queensland connected with olive-growing. When the trees are beaten, a small army of women and children is employed in picking them up. Wages in Southern Italy for women amount to 6d. per day and for boys 4d. per day, without rations; a little wine is all they receive in addition to this miserable wage. Ordinary farm labourers in the mountains are paid 7d. per day, and a shepherd will work for 4s. a month and rations of rye bread and skim milk from dawn to dark. We would rather be without Queensland-grown olives than see them grown for what can but be starvation wages.

THE FIG IN AUSTRALIA.

Some years ago Smyrna figs were imported by the late G. Neilson, then Curator of the Burnley Gardens. Mr. C. T. Cole (ex-nurseryman of Richmond and late horticulturist at Gatton College, Queensland) reports thus to the *Australasian* in respect of two of the trees—namely, the supposed male and female of those imported. They were duly planted, and fruited, both bearing fruit, the fruit being of a pale, yellowish-green, slightly ribbed towards the stalk, of an uneven shape, short in stalk, flesh-pale to bright red, very sugary and juicy, of a most delicious flavour. They would hang upon the trees till they became a perfect rich jelly inside; also they were very good bearers.

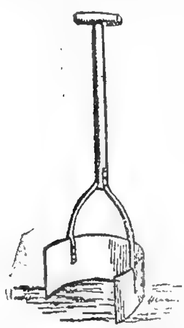
There seems to be a great idea amongst people that the Smyrna fig is the only one when dried which is fit for use. Is it not the manner in which it is prepared for the market which makes it such a favourite? We have several figs here that, to my idea, are equally as good in flavour as the Smyrna, and could be placed upon our markets in an equally good condition if proper care and attention were given to them—namely, White Adriatic, White Marseillese (the true white Genoa), Col de Signora Blanca, Baurgassatte, Gnis, White Pacific, Pan Doree.

It is stated that the fig, especially the Smyrna, will not develop matured fruit without the aid of caprification with the Capri fig—that is, the wasp-like insect called the "blastophaga"—entering the eye of the fig as the pollinating agency. I have noticed many articles on the fig in reference to caprification, saying it is absolutely necessary for the production of fruit. The question arises, Why do figs produce and set their fruit so well as they do in our States without it? No fruit can set without the flowers being first fertilised. Therefore, if our figs set their fruits, it must be by fertilisation, which they receive from the pollen of the flowers. If there be no pollen to fertilise the female flowers, no fruit could set. The blastophaga being so minute, it is impossible for it to carry sufficient pollen into the fig to cause fertilisation. Its entrance simply causes decay or premature ripening, such as a grub will do when it has entered a pear or apple, producing decay by its own death.

The custom of caprification is fast becoming a thing of the past. According to the investigations of modern science, it is proved to be not only unnecessary, but positively injurious, to the fig. May not the cause of figs falling off the trees before they reach the stage of maturity be improper kinds, unsuitable localities, and, last but not least, the absence of knowledge of proper and judicious pruning? And the cause of not placing them upon the markets equally as good as those imported is the want of knowledge and experience as to their proper treatment during the process of drying.

PRUNING THE STRAWBERRY.

In an interesting article on pruning various kinds of fruit trees and berries, in the *Journal of the Department of Agriculture* of Western Australia, Mr. A. Despeissis, Horticultural and Viticultural Expert, deals with the treatment of the strawberry plant. "Pruning the strawberry," he says, "consists in trimming the roots at planting time so as to favour the growth of the fibrous roots which will feed the plant, and later on in cutting all runners before the fruiting season and as soon as they make their appearance. Unless this is done the fruiting of the plant will be seriously checked. Even after the fruiting, some growers still remove the runners, and only leave them on if young plants are required. In fact, treat all runners as weeds the first season. The illustration shows the design of a convenient runner cutter, which saves much trouble. The crescent blade is of such a diameter that it will encircle one side of a strawberry plant, and may be made with an arc of about 9 inches. The appliance is pushed down on one side of the plant, and then on the other side, thus cutting all runners spreading around.



Where the ground is moist the leaves of the strawberry plants are mowed clean off in the winter, then gathered up with a rake and burned. This checks the spread of the leaf spot disease. The same purpose is at times attained by spraying the beds with a solution of sulphate of iron."

Viticulture.

TROUBLES OF VIGNERONS IN GERMANY.

In a Foreign Office report on the vine culture and wine trade of Germany, Consul Niessen says:—As regards the yield, neither the year 1898 nor the year 1899 can be regarded as satisfactory by the German winegrower. The produce of many vineyards did not even cover the amount expended on working expenses, wages, and taxes, and in but few cases did the results show a profit. The vines were late in blossoming in both years, and bad weather was the cause of their progressing very slowly and unsatisfactorily. The shoots formed in but small numbers, and part of the berries dropped off.

The year 1900, viewed as a wine year, shows many peculiarities. A very fine spring was followed by an exceedingly unfavourable early summer. In the last fortnight of the month of May many vines were nipped by frost, and to such a degree as to prevent them from bearing fruit. The vines were very late in beginning to blossom, and this process proceeded most slowly, the result being that the berries dropped off, and the vines were attacked by the hay-worm. For some time after the blossoming the weather continued to be so unfavourable that it was feared the grapes would not ripen. But all at once a change for the better took place. The sun prevailed, and heavy rains falling at the right time promoted the growth and ripening of the grapes in such a manner that in the middle of October the vintage had to be started; that is even earlier than in the great year of 1893.

The 1900 harvest varied considerably in quality according to the amount of frost withstood by the vines and the enemies they had to encounter, as well as according to the sorts of grapes. As regards quality, last year's is a fair wine, ranging between that of 1895 and that of 1897, and approved of by the wine trade. In the Rheingau, the pearl of the German wine culture, there was from one-third to one-half a harvest.

Generally speaking, the whole of Germany cannot be otherwise than satisfied with the year 1900, considered in the light of a wine year, excepting in those districts where the vines suffered from the May frosts or were severely attacked by the sourworm, which latter enemy of the vines, taking up its abode as it does in the grapes, has consumed, in many places, more than a quarter, and in some cases even half, of the shoots. Of the remaining enemies of the vine, thanks to timely and frequent watering of the vineyards on the part of the winegrowers, but few traces of the *Peronospera* and *Oïdium Tuckeri* were to be found. Nor was the grape-louse (*Phylloxera vastatrix*) as destructive as had been expected; although it still exists it spreads but slowly. The country most harassed by the grape-louse is Lorraine, and the Metz district especially, which has succumbed to this insect. The vineyards on the Saar and Moselle are now in danger, and for this reason a petition has been addressed to the Chancellor of the Empire requesting him to take the necessary precautions to separate the vineyards in the Metz district from those adjoining. This little insect has already cost the German Government over 8,000,000 marks (£400,000).

AMATEUR WINE BOTTLING.

It often occurs that farmers and others who have a small vineyard, prefer to bottle the small quantity of wine made to keeping it in the cask. Those who make fruit wines, such as pineapple, rosella, &c., always bottle the product when ready for the operation. A few words, therefore, on home bottling may prove of service not only to the winemakers but also to their neighbours who may purchase a small cask of wine for home consumption. We find a very excellent article on the subject in the *Journal of Agriculture* of Western

Australia, which is so clear and plain in its language that anyone with intelligence can easily follow out the instruction. It refers distinctly to "amateur bottlers"—not to the proprietors of large cellars.

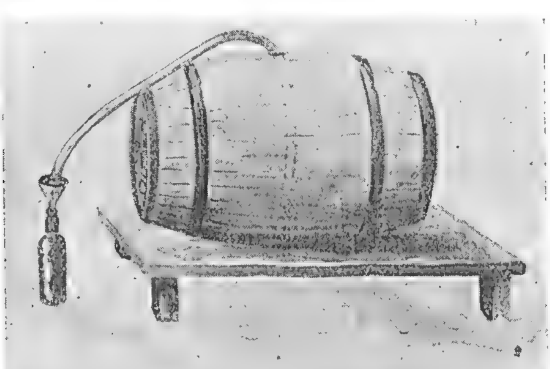
The writer premises that the consumer of bottled wines has to pay not only for the wine but for bottles, corks, capsules, labels, and the cost of labour. By buying a cask of wine, he pays only for the wine, the cask being returnable to and allowed for by the seller. Thus, instead of paying 1s. 6d. or 2s., or even more, a bottle, a good stock of sound wine can be laid down in the cellar at 1s. or even less per bottle.

In selecting wine for bottling, only that which is properly fermented and matured should be chosen. Young wines are still surcharged with carbonic acid gas, with cream of tartar, with dead cells of yeast and of other ferments, and with an excess of colouring matter, which make their use unpalatable as well as unwholesome. Such wines produce dizziness and headaches, they check digestion, and, worst of all, when taken to excess, they lead to kidney troubles. When buying, therefore, always obtain a wine at least two or three years old, of whatever type you require.

Be Ready for Bottling.—The cask having reached the cellar, place it on a small stand, at a height of from 15 to 18 inches from the ground. Having collected the necessary number of bottles—for home use they may be either wine, brandy, or even beer bottles—the first thing to do is to thoroughly clean them. It often happens they have a cork inside; this is easily removed by using a special cork-drawer made with wires armed with a spike or hook at the end, costing about 1s. The bottles are placed in soak in water containing a handful of washing soda for each gallon; they are then cleaned of stains and crust by using small shot or coarse sand and water. It is important that no shot be left in the bottle, as the action of the acid in wine on the shot would result in the wine containing in solution salts of lead, which are highly poisonous. When cleaned the bottles are rinsed in fresh water and placed in cases, in baskets, or in crates to drain.

Corks are also required; these vary in texture and in shape. If a powerful corking machine is available a larger cork is preferable; if not tapered corks should be procured; they cost from 3s. to 4s. per gross. Beer corks, which are cheaper, are unsuitable; they are too porous, and are not lasting enough.

A Syphon is much preferable than taps for drawing the wine from the cask and running it into the bottles. The best syphon is a flexible piece of india-rubber tubing about $\frac{3}{8}$-inch inside diameter. Gas piping answers the purpose very well; 2 yards, costing 1s. 6d. a yard, are sufficient.



A Corking Machine is very convenient. A good substitute is a hand-corking tube, made of boxwood, and costing only 2s. 6d., and a cork-driver, made of a piece of board cut into the shape of a flat beetle.

Modus Operandi.—It is supposed that the wine is bright and in good condition for bottling. If it is turbid and dull looking, write for information, or seek the advice of someone who knows how to handle wine. The cask has been allowed to rest on the stand, bung on top, for a week or so, and any sediment that may have been in it has settled into the bilge of the cask. Remove the wooden shive by hitting the top stave, in which the bunghole is bored, on each side alternately. This will start the shive, which will then be easily removed. If too tightly driven, a wood chisel and a hammer will soon remove it, but the circular bunghole must not be damaged by the chisel, as this will make it difficult to bung it down again when used another time.

The clean bottles have all been arranged around the cask. The operator, after having run water in the indiarubber tubing to cleanse it, places one piece into the cask through the bunghole, as shown in the above illustration, until he feels that the syphon touches the bottom of the cask. He then stands alongside the cask, holds the tube between the thumb and forefinger, about the same height as the top of the cask, sucks only once, and promptly lowers his end of the tube. If the suction has been properly applied, no wine will be spilled, and it will run out at once. Half a glassful is collected, and if not clear and bright is is run into a jug until the clear wine comes out.

The thumb and forefinger compress the end of the tube, which is now placed just inside the neck of the bottle; the pressure is relaxed, and when the wine rises to the middle of the neck of the bottle the rubber tube is pressed again, another bottle is filled, and so on until all the bottles are filled.

Six bottles will be necessary for every gallon of wine in the cask. If the syphoning has been well done there will not be more than a quart of wine left in the cask. Do not use a tap; wine is almost sure to be spilled unless it is cleverly fixed on, and it, moreover, damages the head of the cask.

Corking.—Put the corks in a bucket of warm water; this will soften them and make it easier to drive them. If tapered corks are used they are simply fitted in the neck of the filled bottles, and they are then driven in with the driver. If the corks are not tapered, each one in turn is put in the chamber of the hand corking tube, which is then placed on neck of the bottle, and the pusher is then driven down by means of the driver or a wooden mallet.

It is advisable that the bottles be well filled, but plenty of room should be left for the cork or else the bottle might burst.

When filled, lay the bottles in rows on their sides, and note any which may be leaking at the cork. Put these by for more immediate use; the others are slightly dipped at the neck in bottling wax, which may be bought at a cork merchant's or at a wholesale druggist's for a few pence per pound. Care should be used in melting to keep the wax continually stirred to prevent it burning and assuming the appearance of a gritty deposit.

Wine thus bottled may be kept sound for years. It will greatly improve by keeping for a few months before it is used.

PINEAPPLE WINE.

A small quantity is made as follows:—Over the peelings of two pineapples pour 1 quart of boiling water; allow it to steep until cold, then sweeten to taste, strain and bottle. Tie down the cork, and place the bottle on its side; if placed in a warm place, it will be ripe in twenty-four hours. A small piece of ginger placed in each bottle will improve the flavour. If made in large quantities, the whole pineapple chopped should be used.

Botany.

CONTRIBUTIONS TO THE FLORA OF NEW GUINEA.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

On his recent arrival in Brisbane, His Excellency the Lieutenant-Governor of British New Guinea (G. R. Le Hunte, Esq.) handed to me for identification a small packet of botanical specimens which he had collected in that Possession. Following is a list of the plants contained in the packet. I have also included the description of a new species of *Cassia*, specimens of which were brought to me by Captain F. R. Barton, of New Guinea:—

Order PITTOSPOREÆ.

Pittosporum ferrugineum, *Ait.* Hort. Kew. ed. 2, ii. 27.

Order GUTTIFERÆ.

Calophyllum inophyllum, *Linn.;* W. and Arn. Prod. i. 103.

Order MELIACEÆ.

Carapa moluccensis, *Lam.;* DC. Prod. i. 626.

Order SAPINDACEÆ.

Allophyllus Cobbe, *Blume.* Rumph. iii. 131.

Order LEGUMINOSÆ.

Mucuna urens, *DC.* **var.** No ripe seeds with specimens.

CASSIA.

C. Bartonii, *Bail.* A tree of about 40 feet in height, head spreading, young growth and foliage velvety pubescent; branchlets dark, angular in decurrent lines. Leaves numerous, 6 to 8 in. long, including the petiole of about 1 in.; leaflets, 12 to 16 pairs, oblong, minutely apiculate, 1 to 1½ in. long, 4 to 8 lines broad, the petiolules seldom exceeding 1 line, unequal-sided at the base, parallel-nerves rather numerous, visible on the under side, but the reticulate veins hidden by the downy hairs, the hairs less dense on the upper surface, hence both nerves and veins showing, stipules nearly ½ in. long and 3 lines broad, somewhat reniform, attached near the middle, the lower portion narrower than the upper the upper long apiculate by the exsertion of the midrib, veins more conspicuous than those of the leaflets, pubescent. Racemes lateral, 4 to 5 in. long; bracts about 4 lines long, acuminate, slightly dilated at the base, pubescent. Pedicels 1¼ in. long, sepals ovate-oblong, 3 lines long, pubescent on both sides, the outer side probably dark-coloured. Petals yellow, about 9 lines long, ovate-obtuse, tapering much towards the base, pubescent, and prominently veined. Filaments of the three long lower stamens much longer than the petals, and swollen into a globular appendage near the middle, with oblong anthers, the other stamens shorter than the petals. Pod hard, terete 13 to 20 in. long, 8 to 9 lines in diameter. Seeds thick, light-brown, roundish-oval, 3 lines in diameter, enclosed in a spongy, grey testa 2 lines thick.

Hab.: Mikanagoro, British New Guinea, *Capt. F. R. Barton.*

Cassia Bartonii, Bail.

Maniltoa grandiflora, *Scheff.* [The specimens were the young growth from the end of the branches, with a few of the old leaves at the base, but neither flowers nor roots. From these specimens the plant, when making its young growth, must rival in beauty of foliage its ally, the well-known *Jonesia Asoca*, Roxb. (*Saraca indica*, Linn.), of India.]

Order MYRTACEÆ.

EUGENIA, Linn.

E. Le Huntei, *Bail.* Branchlets soon terete; bark rather loose, reddish. Leaves 3 to 4 in. long, opposite or here and there alternate, lanceolate, the apex often elongated, tapering at the base to a rather thick, wrinkled, dark-coloured petiole about 2 lines long; subcoriaceous, upper surface very dark when dry, obscuring the venation; under surface pale, almost a cinnamon-brown, covered with minute black dots, the primary nerves rather distant, joined by the intramarginal ones which start from the top of the petiole. Thus the leaf has somewhat the appearance of being 3-nerved, reticulate veinlets few. Inflorescence in very slender, loose, elongated trichotomous panicles, terminal or in the upper axils; bracts very minute; pedicels short. Flowers not seen. Stamens—judging from a few remaining on the young fruit—about 3 lines long. Fruit almost globular, 4 to 5 lines diameter, crowned by 4 short, broad calyx-lobes.

Hab.: British New Guinea. The genus *Eugenia* contains probably 700 or more species, more than thirty being found in Queensland. So far the known species of New Guinea are few. The present species differ from all those of which I have descriptions, so I have ventured to attach to it the name of its discoverer.

Order RUBIACEÆ.

Gardenia Hansemannii, *K. Sch.* in Engl. Jahrb. ix. 220.

Guettarda speciosa, *Linn.* Spec. Plant. ed. i. 997.

Order ASCLEPIADEÆ.

Dischidia peltata, *Blume.* Mus. Bot. Lugd. 148.

Order BORAGINEÆ.

Cordia subcordata, *Lam.* Illus. DC. Prod. ix. 477.

Order ORCHIDEÆ.

Dendrobium undulatum, *R. Br.* Prod. 332.

Spathoglottis papuana, *Bail.* Ql. Agri. Journ.

Order GRAMINEÆ.

Panicum virgatum, *Linn.*, var.

Centotheca lappacea, *Desv.*

Order FILICES.

Davallia pusilla, *Mett.* A small growth and sterile.

Lomaria, sp. The specimens insufficient to determine the species.

Grammitis (Gymnogramme) quinata, *Hook.* Spec. Fil. v. 152.

Besides the above there were specimens of four other plants, but these did not afford sufficient material for identification.

I take this opportunity of publishing a description of what I believe to be a hitherto undescribed *Dendrobium*. The plant from which this description is written was grown by Mr. E. Grimley, Brisbane, who received it from Mr. W. Anderson, of Townsville.

DENDROBIUM, Sw.

D. Andersoniana, *Bail.* Stem $1\frac{1}{4}$ to 2 ft. long, terete at the immediate base for a few inches, then slightly swelled for 4 or 6 in., compressed, and from thence tapering to quite a slender termination; leaves 4 or 5 near the top of the stems, oblong-lanceolate, thick and smooth, resembling those of *Hoya carnosa*, nodes very close, peduncles on the old leafless stems, often some inches down the stems, 6 to 9 in. long, including the 5 or 6 flowered raceme; empty bracts 4 or 5, obtuse, with a minute point, and closely adhering to the peduncle, those subtending the flowers more acuminate and loose; pedicels about 1 in. long, slender, greenish-white, abruptly curved at the base of the ovary; ovary about 2 lines long; sepals narrow, acuminate, 1 in. long, but so curled as to appear much shorter, the lateral ones joined and elongated at the base enclosing the sharp rather long spur, all three marked with rather broad lines of minute purple dots; petals linear, erect, about 16 lines long, 2 lines broad towards the end, but more or less narrowing towards the base, slightly twisted, the lower portion stained purple, the upper end of a greenish-brown; labellum 3-lobed, lateral ones cuneate in outline, marked with numerous minute purple dots in oblique lines, end lobe lanceolate, undulate, recurved, marked more prominently but similar to the other lobes; disk plates white, with a narrow lilac-purple edge; claw narrow, green, column short, wings rather broad, blunt on the top, but each ending with a minute tooth at the back; anther-lid broad, flat, yellowish, minutely ciliate in front.

Hab.: British New Guinea, *W. Anderson.*

Apiculture.

BEE-KEEPING—HOW TO KEEP RECORDS OF HIVES, Etc.

By H. R. STEPHENS, Toowoomba.

The present month of September being one of preparation for the forthcoming season, it is necessary to go over all the bees and ascertain the condition of each colony before putting the supers on, presuming that most bee-men follow the practice of removing them during the winter months. There are several ways of keeping a record of hives, but it is very desirable that the method should be simple, and give full information in few words. The plan I adopt is just to write the state of the colony on the cover of the hive, or perhaps on the side if the covers are likely to be changed often. The following is a sample of record. I have examined a colony, and find the queen, the eggs, &c. Well, I write on the hive:—

The words "not cut" mean that the queen's wings are in that state; "super," of course, means that the "super" or top story was placed in position, and the other words explain themselves.*

Other methods of record-keeping are those that are mechanical, and in their way, they are very good, but are generally restricted in usefulness by confining the information to the normal condition of the colony, such as "laying," "queenless," "cells," &c., whereas the beekeepers may require to know which hive to cut the queen's way in, or to unite one with another colony on account of weakness. Or, perhaps, he would wish to know which of his colonies were gathering most honey, and to make a memorandum accordingly. I would like to repeat here what I have intimated in former papers—that anyone examining

* By an oversight, the diagram to which these terms refer has been omitted. We will, however, insert it in the next number of the *Journal.*—Ed. *Q.A.J.*

a hive of bees should look for worker eggs, and also try and see the queen if he has time. The record then would stand thus:

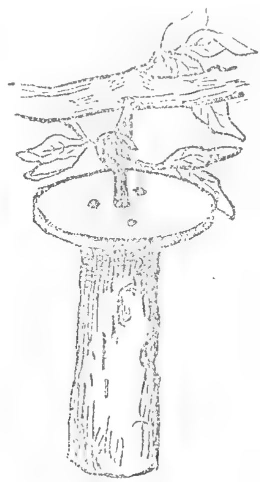
September 14.

Strong eggs. Give super.

If the queen eggs are seen, write "laying." If the queen is not seen, write "eggs." Of course, the presumption is that if eggs are in the cells the queen must be there, but not necessarily so, as she may have been missing during the three days it takes a worker egg to hatch out to a larva.

SWARM-CATCHER.

A swarm-catcher which will save a great deal of worry and annoyance during the swarming season is here illustrated from an engraving in "Gleanings in Bee Culture." It consists of a small block of wood, on the top of which is



nailed a circular board, which is suspended from small branches, vines, or wires, stretched from one point to another, as occasion requires. The Mississippi beekeeper who invented this says that the bees nearly always select these blocks to swarm on. They are easily taken down, and the swarm hived.

Horticulture.

MUSHROOMS IN THE GARDEN.

We have frequently pointed out the ease with which mushrooms can be grown in the garden. Those who live in country districts know that this popular edible grows spontaneously in paddocks where cattle and horses are running. But mushrooms are no more troublesome to grow in the garden than cabbages. All that is necessary is to throw up ridges of well-sweetened manure, covered with a layer of fine soil. As soon as the great heat engendered has subsided, the ridges are planted with pieces of spawn and covered with litter. In favourable weather mushrooms will be gathered throughout the winter. They can stand any amount of frost, but rainy weather is not in their favour. The litter keeps the soil moist, and enables the young mushrooms to push their way out. There is no better way of utilising odd bits of ground in the garden.

Tropical Industries.

THE RICE INDUSTRY, AND ITS SUITABILITY FOR THE QUEENSLAND SOIL AND CLIMATE.

By FRED. WM. PEEK, Loganholme.

Since writing the article on the "Rice Industry of the Logan," which appeared in the August number of this *Journal*, I am pleased to state I have received a large number of letters expressing appreciation of the article, also asking for further information; and I consequently avail myself of your *Journal* to give further information to several inquirers as to what districts would be most suitable for the successful cultivation of rice in Queensland.

I have already stated that climate is an important factor in the success of the industry, but the geographical and physical features must also be taken into consideration. As a crop, rice can be grown anywhere between the 40th parallel of north latitude and the 30th of south; or, in other words, where the climatic conditions allow of the palmtree thriving under natural conditions, the climate will be found to be also suitable for rice culture, always providing there is sufficient rainfall at the right season, or sufficient moisture can be obtained by means of flooding or irrigation. It is well known that, but for the annual flooding of the delta of the Nile in Egypt, the rice crop of that country would fail, and serious loss and famine would be the result. Fortunately for Queensland, we do not depend on floods, as the coastal districts of this State receive a rainfall sufficient to mature the crop which, according to the variety of seed planted, requires from 25 to 30 inches of rainfall spread over the growing season. Crops of rice have been grown during the past season in various portions of this State, and with fair success, at Cairns, Mackay, Tiaro, Logan, Pimpama Island, and Nerang, or from one end of the State to the other, the crops averaging from 32 bushels to 65 bushels per acre, according to variety and quality of seed and soil.

A sample of Japan rice, grown at Mackay, gave a crop of 10 tons of paddy from 10 acres planted, or a little over 37 bushels per acre. This, according to a Mackay paper, was sold on the wharf at £7 per ton, for shipment. It is to be regretted that the crop could not have been milled and dressed in the district, as it would have brought better returns to the grower, and could have gone into local consumption. There are hundreds of acres of land eminently suitable for the growth of rice lying fallow at the present time, particularly in the Nerang, Coomera, and Maroochie districts of Southern Queensland, which, with proper care and cultivation, would return splendid results for the labour bestowed. There is also a very large area in the districts mentioned most suitable for irrigation, which, owing to its natural features, could be both easily and cheaply carried out.

I shall be pleased to give all available information to those desirous of starting a rice plantation, or of adding a rice field to their farming operations. Of this I am convinced—viz., that there is in this State, on almost every farm on the coast, a piece of swampy land, varying from half an acre in extent to 10 or 20 acres, that could be made a means of income to the holder, by putting it under rice. Were the value of rice and the facilities for growing it only generally known, the areas of unsightly and wretched-looking swamps on our farm holdings would be transformed into waving fields of splendid grain, which would be the envy of the visitor from the rich wheatfields of the Darling Downs for their productiveness, and especially for the financial returns to the lucky farmer who takes up rice culture as a part of his work.

Value as a Food.

I am now in a position to give the analysis of rice from an acknowledged authority, as follows:—

	Per cent.		Per cent.
Starch	70·0	Sugar and gum ...	5·0
Gluten	7·5	Epidermis... ...	3·5
Fatty matter ...	7·0	Ash	9·0

Whilst the general composition of rice from another analysis shows:—

	Per cent.		Per cent.
Water	13·7	Non-nitrogenous substances ...	79·4
Flesh-forming ...	6·5	Ash	4·0

Of its value as a food there is no question. In India the natives use it boiled, roasted, or parched as their staple food (and also in China and Japan), undergoing great exertion and fatigue, on this diet alone. With rice and a simple drink of water, they will perform long journeys—1 lb. of rice is equivalent to 4 lb. of potatoes for nutriment—and hence is a food particularly adapted to tropical climates, capable of being made up into a large number of enticing dishes, healthful and easy of digestion. With the acquisition of small hand power mills for dressing and grinding the paddy, it is within the power of our farmers and settlers to grow and produce all that is necessary for their own consumption. And not only as a food is rice of value to our farmers, but then as a large number of by-products, such as starch, of which rice contains such a large percentage, which make it most valuable for household use.

RICE ENSILAGE.

A correspondent informs us that when he was farming in the north of Victoria, he sowed a swampy piece of land with rice. Conceiving the idea that it might make good ensilage, he built a silo of a capacity of 20 tons. When the rice came into ear, and before it began to harden, he cut the whole crop and put it into the silo. There it remained for about fourteen months, and when taken out it proved to be most excellent fodder, which was greatly relished by all the stock. This is worth knowing, seeing that so many farmers who own dairy cattle and pigs are now growing rice as a grain crop. Our correspondent says that ricegrowing pays far better than wheat or maize. We are not surprised that such is the case in a district where, as he stated, the farmers had grown wheat on the same land for thirty years consecutively without the use of any kind of manure.

RICE *V.* PETROLEUM.

The rice crop in Louisiana and Texas will be 25 per cent. short this year. These two States went in so heavily for the cultivation of their swamp lands that it was predicted that in ten years they would furnish the demand of the world for rice. The rice lands were purchased at from 5 to 8 dollars per acre, and the price gradually rose to £8 per acre. Now the land cannot be purchased for love or money. Irrigating contracts have been thrown up. Pumping and boring machinery has been pulled down. Thousands of acres which were to have been planted with rice during the year 1901 have not been touched by the plough. The rice development has come to a dead stop.

What has been the cause of this? The cause is oil. The swamps have been shown to overlie oil deposits, and the oil craze has injured the rice crop. All the lands are being prospected for oil. The planters have left their fields to the hands and gone oil-hunting. The boring plants are taken from the pumping station to bore for oil. Like a thunder-clap the oil fever has burst

over the Louisiana and Texas rice fields. The result is the acreage is cut down, scarcely any attention is paid to the crop, and the vast development which appeared assured in the cultivation of rice has come to nothing.

The rice planters of Queensland, now that they are assured that a rice crop pays, should make every exertion to increase the area under this cereal. There is, as has been shown, a ready market for all that can be grown in this State, and those who have suitable land will be wise if they devote a portion of it to ricegrowing.

The first discovery of oil in Texas is thus described in the *Australian Field*:—A remarkable oil well has been discovered near Beaumont, in Texas. It claims the distinction of being the largest oil well in the world. For months past it has been spouting 25,000 barrels of oil a day—quite a phenomenal output for an oil well. Indeed, few wells have caused so much comment in the new world as the one under notice. So great was the flow from the day it was discovered that its owner offered a reward for a method of stopping it. The volume of oil was so great that it ran into a neighbouring river, and gave considerable anxiety to the inhabitants of neighbouring towns. At last a huge embankment was thrown up around the gusher, and a lake of oil was the result. The petroleum is thrown up with such force that the stream often rises to a height of 200 feet in the air. So far the flow has been an entirely natural one —that is to say, the well has not been shot with dynamite to effect an outlet for the oil. The well was discovered by Captain Lucas, after whom it is named, and there is no doubt that he will make a huge fortune out of his lucky find.

COCOANUTS.

From the *Agricultural Magazine*, Colombo, we take the following useful notes on cocoanut planting. All along the Northern coast of Queensland there are hundreds of islands well adapted for cocoanut plantations, but with the exception of the efforts of the Agricultural Department, very little has been done in this direction, yet few countries have such advantages as Queensland in the tropical features so necessary for success in establishing plantations. We would not suggest that anyone take up the business to the exclusion of agriculture in other forms. That would mean the expenditure of much capital before any return could be expected, but as an adjunct to tropical agriculture on the coast, cocoanuts would prove a valuable and lasting heirloom to the rising generation. Plantations in Ceylon have changed hands at 660 rupees (about £50) an acre. One property of 365 acres, of which 220 acres were planted with cocoanut trees, sold for 48,000 rupees (£4,200). As an adjunct, therefore, to sugar, rice, or coffee growing, 100 acres of cocoanut trees would form a little property not to be despised. To plant such an area 3,500 nuts would be required, allowing them to be planted at distances of 35 feet by 35 feet.

The Benefits of Mulching.—Mr. J. T. Last, F.R.C.S., writes as follows upon the benefits of cultivation as he has found them at Mangapwani:—There are at Mangapwani about 300 bearing palms, from which the nuts are gathered every three months. About three years ago I had the ground well dug up for some 6 feet round the base of each tree, and then packed round the tree any manure, grass, or vegetable matter I could get, covering the same up with soil. This has been repeated every year. The result of these operations is that the number of nuts gathered has greatly increased.

Yield of Nuts.—Formerly the three-monthly gathering would average about 3,000 nuts; now more than double that amount is obtained. The last gathering reached the number of 7,033. Since I started mulching the trees there have always been one or more trees at each three-monthly gathering from which I obtained 100 nuts. At this gathering 110 nuts were gathered from one tree, 100 from two, 91 from one, 89 from one, 86 from one, and 80 from one, making a total of 656 nuts from seven trees.

I think, judging from the above results, we could fairly expect that with proper attention a healthy full-grown cocoanut tree will produce 100 nuts a year.

Cocoanuts in Zanzibar.—The average yield of nuts in Zanzibar Island is from 25 to 30 per tree. Calculating the price at Rs. 20 per 1,000 and the yield at 30, there will be a gross return of 9⅗ annas per tree. Gathering may be set down at Rs. 4 per 1,000, which leaves a net return of about 7⅓ annas or half a rupee per tree.

Pemba trees yield less, the average being probably less than 15 nuts per tree per annum. But labour is cheaper and cost of gathering less—about Rs. 3 per 1,000; so that the net return works out about 4⅓ annas per tree.

Planting Nuts.—Dr. Krapf, in his Swahili dictionary, has the following note:—The natives plant the cocoanut on the 14th day of the moon, because the moon is then at her full power. This takes place before the rain. They take care that the bud is placed downwards in the pit, which is dug to the depth of a cubit. The tree (like the mango) requires five years' growth before it bears fruit.

The generally accepted way of planting a nut is to lay it on its side in a trench about 7 or 8 inches deep (its own depth). It has been rightly pointed out that if a nut be planted eyes downwards the young shoot may rot before it reaches the surface; on the other hand, if planted eyes upwards the milk inside, which is especially provided for the first nourishment of the germ, will settle at the bottom of the nut, and the young shoot will then run a risk of being dried up. Nature seems to have especially pointed both ends of the nut, so that having fallen from the tree it shall remain upon its side to germinate. In the case of the mangrove the young seedling drops from the parent tree upon its pointed end, and sticks in the mud and grows forthwith. But the bottom of the cocoanut could not have been pointed to enable it likewise to stick in the sand and germinate, because a nut always falls upon its side. This is well shown by dropping a few nuts from the roof of a high house. If the nut is suspended by the stalk, in the way it hangs upon a tree, and dropped, it will turn half over and fall sideways. The same thing happens if the nut be held upside down. If it be held horizontally it will maintain this position till it reaches the ground. Nature is always a safe guide. Allow a space of 9 inches or 1 foot between the nuts in the trench, and 18 inches between the trenches. This gives plenty of room to lift the nuts when the time comes for them to be planted out, without doing much damage to the roots. April is the best time to plant out the seedlings, when they should be five or six months old. Hence the nuts should be planted in the nursery in November. But no hard-and-fast rule need be laid down, especially as our seasons are uncertain. Thirty-five feet by 35 feet is a good distance for them to be placed in the plantation. This gives thirty-five trees to the acre.

COST OF PRODUCTION OF COFFEE.

The *Tropical Agriculturist*, Ceylon, prints a long article from the ***Brazilian Review*** on the above subject. From it we extract the following:—

According to the owners' statements the cost of producing Santos coffee on the Fazendas Schmidt and Dumont, which probably have more coffee-trees than any other plantations in the world, is 4 cents per lb. bagged, ready for shipment on the plantation; 5 cents per lb. in Santos; 6 cents per lb. in warehouse in New York. At this price nobody makes any money except the brokers, railway companies, and steamship lines. These figures are based on the average product of the plantation, which would probably be somewhere between numbers five and six, New York exchange standards.

Of course, the smaller plantations cannot produce at the same price as the larger ones, and the question of the survival of the coffee planter is getting to be largely a matter of transportation. Undoubtedly many coffee planters will be forced out of business from mere inability to pay their labourers for the

picking of the coffee and the care of the plantation. Probably the first decrease in production will come from this reason. The planter whose shipping facilities are close to a railroad can, perhaps, make expenses at the above figures, but the one who must cart his product five or twenty-five miles to a railroad station must go to the wall. Of course, this applies with greater force to those planters in Mexico, Venezuela, and Columbia, who must put a couple of bags of coffee on a "burro" and take anywhere from one day to five days' journey before they can reach a shipping point. All of them are at present losing money largely, and it is only a question of time when they must stop.

On the other hand, those large plantations along the line of the Tehuantepec railroad in Mexico have a rate of freight of 50 cents per 100 lb. from the plantation to New York, as against 250 cents for the planter in Sao Paulo. These Tehuantepec plantations claim that they can put washed Oaxaca coffee in New York at a cost of 5½ cents per lb. Now, suppose the Brazilian planter receives nothing at all for his coffee on the plantation. It still costs him 2½ cents per lb. in New York in actual transportation expenses. It is probable that no one will dispute the statement that washed Oaxaca will always bring at least 3 cents per lb. more than the average Brazil coffee. Consequently, while the Brazilian was getting 2½ cents per lb. for his coffee, which would only pay the transportation expenses, the Tehuantepec planter would obtain 5½ cents for his coffee, at which price he could live, but not pay any dividends on his stock. There is no place in the world that can compete with him in coffee production, largely on account of his superior transportation facilities and the superior quality of his product. Moreover, he can also raise rubber, pineapples, sugar, oranges, lemons, and other products which pay a profit to reduce the cost of coffee production. A rubber-tree shades his coffee-tree, and it costs him 5 cents per lb. to produce the rubber after the tree is matured. The rubber sells for 65 cents. A handsome profit, surely.

Fortunately for the Brazilian, the area suitable for coffee planting in this region is limited, or the Brazilian would have harder competition than he ever had before. There is no doubt but that, were there area enough in Mexico along the line of this railway, all other coffee planters would be driven out of business, and no one in the world could compete with such plantations as the "Doa Rios" and "Uberos," run by American capital on American business principles, with a stable government and a railway depôt on the plantation itself. Moreover, they have two outlets—one by way of Coatzacoalcos to New York and Europe, and the other *viâ* Salina Cruz to San Francisco and the Pacific Coast.

* * * * * *

The railways engaged here (Brazil) in this traffic nearly all earn handsome dividends of 12 to 14 per cent., and could, in Sao Paulo at least, probably reduce rates to half without losing money. On the other hand, coffee has been constantly carried to New York at 10 cents per bag without loss, and could be again, if necessary. So that, altogether, a reduction of carrying charges from 112 to 60 or 70 cents per 100 lb. is by no means an impossibility. The method of estimating the cost of production followed by the correspondent of the *Journal of Commerce* is, however, misleading and arbitrary. Brazilian coffee is now selling in New York at little over 6 cents, or ½ cent under what he estimates to be the cost of delivery, and has before been sold at 5 cents, the price he estimated as the cost of delivery at Santos. In spite of such low prices, however, coffee does not cease to be produced nor to be shipped, which certainly would be the case had the price really fallen under the cost of delivery. At 5 or 6 cents per lb., coffee may not leave much profit to planters, but before Brazilian coffees could be driven from the markets there are wide margins yet to be reduced not only in the prime cost of production but of freight and handling. Should extensive cultivation prove too costly, it must be made intensive and labour replace planters as proprietors, as was the case with cotton in the Southern States. But, come what may, coffee will never cease to be profitably produced, because Brazil possesses an almost unlimited area and climate suitable for growing coffee such as no other country enjoys.

SPINNING INDUSTRY IN THE UNITED STATES.

H.M. Consul-General at New York reports that, at the end of August, 1900, the number of spindles in the Northern States of America had increased by 100,000, bringing the number up to 14,050,000, while those in the south had increased by over 500,000, bringing the number up to 4,540,515. The new mills erected and in the course of erection in the south are said to show a very large proportion of plants, with 15,000 spindles or less, put up almost entirely by local capital, showing confidence in the future of the Southern cotton industry.

It is stated that American spinners took 3,687,000 bales, while British spinners took only 3,334,000 bales of cotton in 1900.

It is stated also that the total exports of cotton cloth from the United States amounted to 257,910,508 yards in 1900, compared with 418,504,132 yards in 1899, showing a reduction of about 16,000,000 yards of coloured cloth and nearly 145,000,000 yards of uncoloured. There was a slight increase in the exportation to the West Indies and Bermuda, to South America, and to Australia, and an increase of about 6,000,000 yards to the East Indies, but a decrease in almost every other case, which amounted in that of China to over 126,000,000 yards. The total imports of cotton cloths from Great Britain diminished from 50,000,000 yards in 1899 to 40,800,000 yards in 1900; those from France, Germany, and Switzerland showed a fractional increase.

THE FUTURE OF COTTON SEED.

Cotton seed (says the *Florida Agriculturist*) is more rich in that which makes food than wheat. People are getting informed upon the subject, and are giving cotton seed its position with other grain. Here is a comparison and values of cotton and wheat. It is an instructive table:—

Wheat: Protein, 11·87; carbohydrates, 73·69; fat, 2·09; value, 1 dollar.
Cotton Seed: Protein, 17·57; carbohydrates, 10·82; fat, 20·19; value, 1 dollar 39 cents.

The above table gives the number of pounds of food components and the analytical value of 100 lb. each of wheat and cotton seed, according to the methods in use by the agricultural experiment station. It shows the surprising fact that, pound for pound, cotton seed has a greater intrinsic value than wheat. Neither is the bulk of the cotton-seed crop by any means significant as compared with wheat.

There is no doubt but that cotton seed is going shortly to become one of the most important foods.

That which can be made from cotton seed will by its own merit crowd its own way to the front. It will be a staple article upon the municipal market of every civilised land. It will be but a few years before cotton-seed flour and cotton-seed meal will be common staples to be purchased at any good market in the country.

SUGAR-CANE FROM SEED.

The experimental overseer at Hambledon plantation, Cairns, Mr. Clarke, has been successful, we are informed, in propagating cane from seed, and has hundreds of seedling canes now coming on. Not only has this been done, but he has also succeeded in getting the seed to germinate under trash, under natural conditions. This success will be of great interest to sugar-growers, as possibly some new good variety may be found amongst the seedlings. [For full particulars of Mr. Clarke's experiments, we refer our readers to the *Mackay Sugar Journal* of 15th September, which contains a most interesting article on the subject.—Ed. *Q.A.J.*]

DIVI-DIVI PODS.

The Board of Trade Journal says that the pods of a Queensland sample of this plant (*Cæsalpina coriaria*) have been analysed and found to be of excellent quality, and highly valued (for tanning purposes) by the brokers to whom the sample was submitted.

Forestry.

FOREST CONSERVANCY AND THE FARMERS.

Since at last the forests of Queensland have been placed under the protection of the Government, it may be asked, "What interest have the farmers in forest conservancy?" We say they have a vital interest in the matter. Every farmer should take an intelligent interest in it, if only for the reason that with the destruction of the forests the cost of living on a farm would be almost too great for profitable occupation of the land. Practically every farmer who plants an orchard, going about it in a scientific manner, is a forester. Whilst his ordinary crops come to maturity in from two to six months or a year, his fruit trees in some cases take seven, ten, or even fifteen years before he reaps the full reward of his care of them. Forest tree planting is merely orchard planting, with the difference that orchard trees are grown for their fruit, whilst forest trees are grown for the sake of the timber. On nearly all farms there is some land which is worthless for farm crops or for fruit trees or vines, but such land will grow excellent timber. Compare the quantities of the principal chemical substances taken annually out of an acre of ground by various field crops and by forest trees as shown by Dr. Schlich in his "Manual of Forestry." Taking an average of the crops, we have the following:—

Total Ash in lb. per Acre.	Potash.	Lime.	Magnesium.	Phosphorus.	Sulphur.	Silica.
Field crops, 235 lb.	78	43	17	28	11	37
Wood and leaves, 126 lb. ...	11	62	10	8	3	29
Wood only, 19 lb.	4	9	2	1·4	0·4	1·6

This clearly shows that timber trees take far less nutriment out of the soil than any farm crops, and that they may therefore thrive in situations where nothing else would grow. Thus the right management of a farm, so as to utilise every acre of it, would include forestry. Farmers require wood for an infinity of purposes, and they can grow it themselves without waiting a vast number of years. Those who have taken note of the rapid growth of pine and cedar trees, and the comparatively rapid growth of many hardwoods, cannot fail to have observed that in a very few years some return may be got from a plantation in the shape of thinnings, such thinnings being useful first for cockatoo fences, clothes props, scaffold poles, posts, plates, and rafters for barns, sheds, yards, and, later on, for stumps for frame houses. There are men living a few miles out of this city who make a good addition to their income by sending weekly supplies of clothes props into town, which they dispose of at 6d. each. Firewood is an absolute necessity, but where will it come from when the available supplies are used up? Farmers, therefore, should be especially active in their societies and associations to secure the best possible legislation on forest conservancy. The State work must of necessity be undertaken by the Government before forestry can be systematically taken up as farm orchard work, because it can only pay as a separate business when extended over large areas devoted to no other purpose. Already our Forestry Department has been actively engaged in looking into our timber supplies, and considerable areas have been added to our timber reserves, but farmers with large areas of land can assist greatly in the work by devoting a portion of their poorest land to arboriculture, and they will find that by so doing they will not have to wait for posterity to reap the whole benefit, whilst at the same time they will be assisting to enrich the country at practically no cost to themselves.

Science.

ANALYSIS OF THE SEEDS OF THE MORETON BAY CHESTNUT, OR BEAN-TREE.

(*Castanospermum australe*, A. Cunn.)

By J. C. BRUNNICH, F.C.S.
Chemist to the Department of Agriculture.

The Moreton Bay Chestnut, or Bean-tree, a handsome tree which grows luxuriantly on most of our river banks, produces a large amount of seeds, resembling in appearance and size the European horse-chestnuts. These seeds are found in a thick pod or bean, containing generally three seeds. When ripe these pods drop on the ground, they burst open, and the seeds are eaten by horses and cattle grazing near such trees. Severe losses of horses and cattle have been caused by animals eating the beans, for which they seem to get a great liking.

Hitherto the ill-effects of the beans have been attributed to the indigestible character of the seeds, as no active poisonous principle could be detected. The analysis of the beans which I just carried out, shows that the seeds cannot by any means be more indigestible than other seeds of a similar nature, and that the ill-effects are unquestionably due to a large amount of the glucoside "saponin" found in the seeds.

Before I give the result of the analysis and the manner in which it was carried out, I will state some of the evidence with regard to the effect of the beans as a food for man, or as a food injurious to stock, taken from an exhaustive article on the Moreton Bay Chestnut, by Mr. J. H. Maiden, the Government Botanist of New South Wales, which appeared in Vol. V., Part 1, of the *Agricultural Gazette* of New South Wales:—

"By the natives the fruit is eaten on all occasions. It has, when roasted, the flavour of a Spanish chestnut, and I have been assured by Europeans who have subsisted on it exclusively for two days, that no other unpleasant effect was the result than a slight pain in the bowels, and that only when it is eaten raw." Sir William Hooker adds a note: "Although the large and handsome seeds are eaten by the natives of the Brisbane River, and by the convicts in that part of our colony, as a substitute for our Spanish chestnuts, I have found them hard, bitter, and their flavour not unlike that of the acorn." Extended experience shows that very few stomachs can tolerate them. Dr. T. L. Bancroft, of Brisbane, has examined the beans, and is very emphatic in regard to their deleterious properties as far as man is concerned. He states that if a small piece of the bean be eaten, it causes severe diarrhœa, with intense griping, and he states that it does this whether it has been previously soaked in water or even roasted. He states that no poisonous principle is removed by water, and no part of the plant is bitter. Mr. Charles Moore, director of the Sydney Botanic Gardens, exhibited a sample of starch or flour of the beans at the Intercolonial Exhibition of Melbourne, 1866, and he supplies the following information concerning his exhibit:—The beans are used as a food by the aborigines, who prepare them by first steeping them in water for from eight to ten days. They are then taken out, dried in the sun, roasted upon hot stones, and pounded into a coarse meal, in which state they may be kept for an indefinite period. When required for use, the meal is simply mixed with water, made into a thin cake, and baked in the usual manner. In taste, cakes prepared in this way resemble a coarse ship biscuit. Usually the aborigines scrape it, by means of jagged mussel-shells, into a vermicelli-like substance prior to soaking it in water. The starch or flour is neither better nor worse than many of the food

starches at present consumed for food. As an experiment, a chemist at Lismore once made 40 lb. of starch from the beans, which he sold at 4d. per lb. Opossums are fond of the beans. Stockowners have long waged war against the tree owing to the belief that cattle and horses are poisoned through eating the seeds. They are not, however, a poison in the strict sense of the term, since no alkaloid or poisonous principle can be found in them. They have frequently been examined by chemists, and Mr. W. M. Hamlet, Government Analyst, has reported on the subject to this department with negative results (Annual Report of Department of Mines, New South Wales, 1886, p. 46). All the same, the beans kill the stock owing to their highly indigestible character, the indigestible portion in time forming a ball in the stomach. Following are some interesting notes in regard to bean-poisoning on the Richmond River:—"1883 was a dry season, and grass scarce. —— informed me that he had lost over 100 head of cattle by bean poisoning. Next day my attention was drawn to a few cattle in a stockyard said to be poisoned by eating beans. I inquired of the stockman if he had any proof that they had eaten beans, when he pointed to a beast that had died the day before, and beans had been taken from its stomach. In reply to my questions he said he expected some of the cattle in the yard to recover. They appeared much purged, discharging thin watery fœcal matter. —— lost a valuable entire horse and cattle in this way, and many others have similar experience. It appears to affect horses in a different way to cattle. —— informed me that while removing horses from a paddock in which the bean-tree was growing two of them died without previously showing any symptoms of poisoning. The seeds are also rapidly fatal to pigs in some cases, probably when devoured on an empty stomach."

As a fine cluster of these bean-trees grows on the banks of the Lockyer Creek, in one of the paddocks of the Agricultural College, which cluster, however, was fenced off to keep the cattle from getting at the beans, I had a good opportunity to get a large sample of fresh seeds for analysis. I also obtained easily a very good sample of starch from the seeds, and I have no doubt that in the neighbourhood of large clusters of these trees starch could be obtained in payable quantities.

For the analysis I prepared the beans by shredding them roughly into thin slices, and determining the moisture in a fresh sample of these slices. The bulk of the sliced seeds was left exposed to the air to dry spontaneously. This air-dried sample was ground into a fairly fine flour (all passing through a sieve with thirty meshes to the inch), and this prepared flour was used for the exhaustive analysis, calculating the composition of the fresh seeds from the analysis of the air-dried flour.

The tabulated result of this analysis is as follows:—

	Air-dried Flour. Per cent.	Fresh Bean. Per cent.
Water	10·68	55·76
Fat	1·06	0·52
Chlorophyll	0·39	0·17
Albuminoids, soluble in water	5·41	2·68
Do. do. do., coagulated when boiling	1·18	0·59
Do. insoluble, Legumin	4·44	2·20
Glucoside, Saponin	14·58	7·23
Starch	37·54	18·59
Mucilaginous substances	3·18	1·57
Dextrin	4·98	2·47
Glucose	0·64	0·32
Woody fibre	7·99	3·96
Crude ash	2·21	1·09
Undetermined extr. matter, colouring matter, organic acids, pectin, &c., by differ.	5·72	2·83

Analysis of the Crude Ash.

	Per cent.
Soluble in water	73·05
Insoluble in water, soluble in HCl	19·70
Unburnt carbon	7·25
Phosphoric acid	26·17
Chlorine	2·48
Potash	29·81
Soda	3·44
Lime	6·16
Magnesia	6·88
Unburnt carbon	7·25
Carbonic acid by differ.	17·81

The result of the analysis was obtained as follows, most operations being carried out in duplicate :—

	Per cent.	Per cent.
Extract by petroleum spirit (boiling under 45 degrees C.)...	1·02	1·10
Extract by ether (water free) chlorophyll	0·40	0·39
Extract by absolute alcohol, principally glucose, with a trace of tannin, no alkaloids	0·73	lost.
Extract by cold water	27·04	...

As the previous treatment with ether and absolute alcohol made some of the albuminoids insoluble, a fresh watery extract of the flour was prepared.

	Per cent.	Per cent.
Extract by cold water of air-dried flour	28·48	27·96
This watery extract contained :—		
Ash	1·65	1·60
Total nitrogen	1·054	1·055
Soluble albuminoids calculated from nitrogen ...	6·59	6·59
Soluble albuminoids coagulated when boiling the watery extract, vegetable casein	1·18	...
Precipitated by absolute alcohol :—		
1st. Mucilaginous substances	3·22	3·14
2nd. Dextrin	4·98	6·70

When treating the watery extract with 4 vols. of absolute alcohol, there is a danger that part of the saponin is also precipitated with the dextrin, if the filtering is not done very quickly. As the second sample filtered very slowly, the dextrin contained a large amount of saponin, by giving the characteristic test, when treated with sulphuric acid.

Not precipitated by absolute alcohol glucose ... ... 0·64

For comparison with the usual method of extraction, extracts with benzol and 80 per cent. boiling alcohol were also made :—

	Per cent.
Extract by benzol (C_6H_6) boiling at 81°C.	1·43
Extract by 80 per cent. alcohol (Sp. Gr. ·8483 at 15°)	19·88
Of this extract was :—	
Soluble in absolute alcohol...	2·50
Insoluble in absolute alcohol, but soluble in water, and precipitated by subacetate of lead	17·16

The saponin was determined in accordance with the method recommended by Christophson and Otten (Dragendorff's Plant Analysis, p. 68), by extracting with boiling 80 per cent. alcohol, filtering when hot, boiling off the alcohol of this extract, and precipitating the saponin with concentrated baryta water. For the quantitative determination, the residue of the flour, after having been treated and extracted with petroleum ether, ether and absolute alcohol were used, and gave in an average of several determinations—14·58 per cent. saponin. Larger quantities of the glucoside were prepared from fresh samples of the

flour. The purest saponin was obtained on cooling of the alcoholic solution, in the form of a white curdy precipitate. I also separated the saponin by evaporating the alcoholic solution, precipitating with baryta water, and decomposing the baryta-saponin with carbonic acid, and separating the saponin by shaking the watery solution with chloroform.

The yellowish, amorphous powder obtained had a peculiar sweetish taste, was easily soluble in water, chloroform, and in hot dilute alcohol. From the solution, it was precipitated with subacetate of lead, boryta water, and also, to a slight extent, by acetate of lead, but gave no reaction with Mayer's solution By moistening a trace of the dry saponin with strong sulphuric acid, or, better, with fuming sulphuric acid, a beautiful red colour is slowly formed, turning purple and becoming darker on standing. This colour keeps for days. A small quantity of the saponin dissolved in water forms a strong froth on shaking the solution.

Both these reactions may be shown with slices of the fresh or dried seeds, as when moistening the surface with sulphuric acid, very shortly, bright red spots and streaks are formed; again, when putting a few slices of the seeds in water and shaking the mixture, a froth is formed as if soap were present.

A peculiar reaction, which I have not seen mentioned in any of the works at my disposal, is that the sample of saponin prepared from the beans, on the addition of ammonia, dissolves in the cold with a beautiful carmine colour, which appears only gradually, and gets more brilliant as exposed to the air. After a while, the colour begins to fade, and remains yellow; when heating, the red colour disappears rapidly. The saponin itself is not changed, as, on evaporation of the ammoniacal solution with sulphuric acid again, the characteristic glucoside reaction is obtained. Weak caustic potash dissolves a trace of the saponin with a brick-red colour, also changed into yellow on standing or heating. I don't know if this peculiar reaction is due to the impurity in my samples of saponin or not. The air-dried sample of the bean was also tested for alkaloids, but no trace of a bitter principle can be found in alcoholic extract or acidulated alcoholic extracts. That the substance obtained from the hot alcoholic soluble extract is really a true saponin, is further proved by the fact that a solution of it does not reduce Fehling's copper solution. When heating a solution with dilute acids for some time, the saponin is decomposed into glucose, and *into a* substance—saponogin, sparingly soluble in water. The inverted saponin solution, due to the presence of glucose, acts at once on Fehling's solution. The saponogin is soluble in hot alcohol, and forms, on evaporation, a crystalline residue.

I consider the presence of a saponin in the beans undoubtedly proved, and the toxic effects of the bean are due to this glucoside.

As saponin is very soluble in water, it also shows that by soaking the crushed beans for a few days in water, as practised by our aboriginals before using the seeds as food, the poisonous principle is removed, leaving a rather valuable nutritious food.

ANALYSES OF CHEESE AND BUTTER MANUFACTURED AT THE QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

By J. C. BRÜNNICH, F.C.S.,
Chemist to the Department of Agriculture.

The matter of the adulteration of foods has been, of late, brought so prominently before the public, that it is quite refreshing to be able to give the analyses of absolutely pure butter and cheese as manufactured at the Queensland Agricultural College.

Hitherto no exhaustive analysis of our colonial manufactured articles have been made, and the food analyst had always to rely for his standards on the analyses published in England and America, and I am sure that the analyses of

the cheese and butter given below will be a valuable addition to such work, principally as various methods were tried, and as the analyses show how closely the results obtained from our pure products agree with the home standards:—

CHEDDAR CHEESE.

Manufactured from whole milk, at the Agricultural College, 5th May, 1901.

	Analysed— 4th July. Two Months old. Per cent.		Analysed— 10th September. Four Months old. Per cent.
Water—			
Stutzer's sand mixture	31·66		27·71
Richmond's method (31·64 and 31·54) ...	31·59		27·63
Fat—			
Short's method with CuSO, ether extr. ...	35·02		37·53
From sand mixture after water deter. ...	35·48		37·49
With Gerber's acido-butyrometer ... {34·9, 35·3}	35·1	{37·0, 37·4}	37·2
Ash—			
Stutzer's method	4·07		...
Richmond's method (4·11, 4·13)	4·12		4·04

The ash contained—

	Per cent.
Soluble in water	1·495
Insoluble in water	2·547
Total ash	4·072
Phosphoric acid...	1·217
Lime	1·410
Magnesia	0·112
Potash	0·134
Salt, sodium chloride	1·442

Nitrogen determinations—

	Two Months old.	Four Months old.
Total nitrogen, Kjeldahl's method—		
With ordinary sulphuric acid (3·87-3·89) ...	3·88	4·194
With sulphuric acid P.O. (3·93-3·96) ...	3·95	4·202
Nitrogen as ammonia (3 determin.)	0·026	0·049
Do. amides	0·310	0·749
Do. albumose (2 determin.)	0·875	0·742
Do. peptone	0·011	0·294
Do. proteids (by difference)	2·723	2·368

Richmond's Method of Analysis.

	Cheese— 2 Months old. Per cent.	Cheese— 4 Months old. Per cent.
Water	31·59	27·63
Fat (average)	35·25	37·51
Ash	4·12	4·04
Primary products of ripening	5·29	6·40
Secondary products of ripening ...	2·35	5·94
Proteids (by difference)	21·40	18·48

The total solids contained also:—

Lactic acid	1·368	1·359
Butyric acid	0·053	0·114
The fat contained in the cheese melted out at 60 C. gave:—		
Rechert-Wollny figure (28·95 29·20)	29·07	29·30
Zeiss butyro refractometer (at 40 degrees C.)	44·2	44·0
The fat extracted with ether gave:—		
Zeiss butyro refractometer (at 40 degrees C.)	44·3	44·2

The analysis shows the cheese to be of a very high quality, and it compares very favourably with English and American Cheddar cheeses, which, according to the average of the various analyses given in Richmond's standard work on "Dairy Chemistry," page 304, contain:—

	Per cent.
Water	30·5
Fat	29·2
Proteids	33·6
Lactic acid	1·4
Ash	4·0

The effects of the ripening of the cheese on the organic nitrogenous matter is distinctly shown, when comparing the analysis of the cheese two and four months old.

The butter fat, however, remains apparently quite unaltered during the ripening, and gives almost identical results with regard to the Reichert-Wollny figure of volatile fatty acids, and the refractive index by the Zeiss butyro refractometer.

For a quick estimation of the fat in the cheese the Gerber's acido-butyrometer can be strongly recommended; the best results, however, are obtained by mixing a weighed quantity of the cheese with an equal weight of water to a creamy consistency in a mortar, and to fill the little glass cups with the mixture, which are weighed and treated in the usual manner. By filling the cups directly with the cheese frequently little lumps remain, which are not dissolved by the acid mixture.

ANALYSIS OF BUTTER

Manufactured by the Queensland Agricultural College, 7th July, 1901:—

		Per cent.
Fat		88·42
Water (8·94-8·98)		8·96
Casein (N 6·37)	0·45	...
Milksugar (differ.)	0·29	...
Salt	1·92	...
Ash	0·08	...
Solids not fat		2·74

Fat determined by the Gerber's acido-butyrometer gave 89·0 and 89·2 per cent.

The percentage of moisture, which in this sample is a little lower than usual, was determined by drying a weighed quantity first with the help of quartz, and second with the aid of pumice-stone. The time required to be left in the water, even in order to get the lowest weight, was 1½ hours, and the results were in both cases practically identical—8·94 and 8·98 per cent. respectively.

The usual percentage of water in our College butters is, from an average of several samples taken at various times, 12·5 per cent.

The fat was determined in the sample dried with pumice-stone in a tin capsule, the whole being transferred to a Soxhlet's extractor and extracted with water free ether for four hours. Another sample of the butter was mixed with plaster of Paris, a method also recommended, and extracted with ether, but gave after treatment of four hours only 76 per cent. of fat.

The Reichert-Wollny method applied to the pure butter fat obtained from above sample of pure butter, and also to artificially made mixtures of this butter with margarine, was carried out in accordance to the official method of the Society of Public Analysts, as published in the *Analyst*, December, 1900, and I obtained the following results:—

	Reichert-Wollny Figures.	Number.	
Pure butter fat	29·25	29·40	
Butter, 20 per cent. margarine	22·95	22·50	
Butter, 33·3 per cent. margarine	18·10	18·55	
Pure margarine	0·75	0·80	
Blanks	0·05	0·10	
Butter fat from cheese	28·95	29·29	29·30

The value of the refracting index, with the aid of the *Zeiss butyro refractometer*, was proved by using the instrument for the same sample of butter and the mixtures of butter fat with margarine, the butter fat obtained from cheese in various ways, extracted by heat and by ether. At the same time I tested various oils and fats of standard quality, and give the result of the examinations in the following table:—

	Scale Divisions at 40 degrees C.	Remarks on the Critic Line.
Pure butter	44·1	Sharp and colourless
Butter + 20 per cent. margarine	45·2	Do. do.
Butter + 33·3 per cent. margarine	46·0	Do. do.
Pure margarine (Merck's) ...	49·9	Do. slightly blue
Butter fat from Cheese—		
Melted out at 60 degrees C.	44·0	Do. and colourless
Ether extracted	44·2	Do. do.
Cotton-seed oil...	57·2	Broad band, blue to purple
Sesame oil	58·0	Do. do.
Olive oil	53·7	Do. blue
Lard	51·0	Sharp, and slightly blue
Cocoanut oil	35·3	Band, and slightly reddish
Palm oil (Elaidin)	37·3	Do. do.
Castor oil	70·2	Broad blue band
Cod liver oil	70·2	Do. do.

When using Dr. Wollny's special thermometer with the refractometer, which simplifies the working of the instrument when applied to the testing of butter and lard, the following readings were obtained:—

	Reading of— Thermometer.	Telescope.		Difference.
Pure butter fat	44·4	44·0	...	− ·4
Butter + 20 per cent. margarine	44·5	45·1	...	+ ·6
Do. + 33·3 per cent. margarine	44·45	46·0	...	+ 1·55
Margarine...	44·4	49·9	...	+ 5·5

Butter fat from cheese—

Ether extracted	44·0	44·0 ...	0
Do. do.	44·0	44·0 ...	0
Melted out at 60 degrees C. ...	48·6	48·3 ...	— ·3
Do. do. ...	47·1	46·9 ...	— ·2
Do. do.	44·8	44·5 ...	— ·3
Petroleum ether extracted ...	44·3	44·2 ...	— ·1
Pure lard	51·0	52·0 ...	— 1·0
Do. other sample	54·3	54·3 ...	0

All these numbers agree very closely with the results given by Mr. J. White, F.I.C., in his article on the use of the butyro-refractometer in the Journal of the Society of Chemical Industries, December, 1900.

It will also be noticed that from the readings of this valuable instrument a very close estimation of the amount of margarine added to a butter may be made. We find by calculating from the readings an addition of 19 and 32·8 per cent. respectively in two samples of mixtures of butter with 20 and 33·3 per cent. margarine .

For the testing of other oils, lard, &c., Zeiss butyro-refractometer is equally valuable, but in order to get a good reading with oils which give the critical line in the form of a blue or purple-coloured band, monochromatic light from a sodium flame, or by interposing a cell filled with a solution of potassium bichromate between the mirror and the body of the instrument, should be used.

FOOT-AND-MOUTH DISEASE.

At a recent meeting of the Academy of Medicine, Dr. Jarre announced the discovery of a remedy for the foot-and-mouth disease, which is so fatal to sheep. He says he has successfully used the remedy in 1,500 cases in two years. It consists of a concentrated solution of chromic acid at 33 per cent. chemically pure. This is employed as a caustic to the sore. The cure is rapid and certain. Dr. Jarre says that M. Dupuy, Minister of Agriculture, has promised to give the remedy official tests.—*Scientific American.*

The above was submitted to Mr. P. Wicken, of the Western Australian Department of Agriculture, who stated :—"Foot-and-mouth disease is a specific eruptive disease, affecting especially the mucus membrane of the mouth and the skin around the coronet, and between the digits. It is both contagious and infectious. It affects sheep, pigs, poultry, dogs, horses, and human beings. It is therefore necessary that all infected carcasses should be burned. It is prevalent both in Europe and America, but up to the present time not in these States. Chromic acid is a powerful caustic and antiseptic, used to remove warty excrescences, and applied to indolent ulcers, putrid sores, and cancers. It would require great care in application, as at the strength above mentioned it would be very caustic. Chromic acid is not to be obtained in this State, but the price quoted in the English price lists is 4s. per lb. chemically pure. It can be obtained in the Eastern States."

THE SLIDE RULE IN EXPERIMENTAL WORK.

Anyone who has once been employed in compiling the comparative yields from experimental plots, will agree that it is a very tedious operation, involving a large number of simple problems, which vary only in conditions and in answer, the statement in every case being the same. The object of this article is to show how the work can be done quickly, accurately, and easily by means of a cheap carpenter's slide rule.

It does not come within the scope of the present article to explain the principle on which this instrument is constructed, nor to discuss the many uses to which it can be put. Volumes have been written on the subject, and by abler pens. It is sufficient to state that the rule is simply the mechanical application of the principle of logarithms.

As a rule, the yield of grain for each separate plot is weighed in lb., and from this the yield per acre in standard bushels is calculated. As in most cases the plots are of the same size, it is only necessary to first set the slide rule at the constant number, or divisor, and then opposite to each weight per plot will be found the yield in bushels per acre, so that the results for a large number of plots can be read off at one operation. Where the plots vary in size, the area in square links or square feet must be ascertained, and, setting this at the proper divisor, opposite the lb. per block, will be found the bushels per acre. As experimental plots are now usually sown in drill widths, so knowing the width of the drill, by setting the length of the plot to the ascertained divisor, the yield per acre in bushels will be found opposite to the weighed yield in lb. per plot. The following table gives the divisors for the conditions mentioned above:—

Dimensions.	Yield.	Answer.	Wheat.	Oats.	Barley.
Length in feet	lb. per plot	lb. per acre	43,560	43,560	43,560
,, ,, ...	,, ,,	tons ,,	19·44	19·44	19·44
,, ,, ...	,, ,,	bushels ,,	726	1,089	871·2
Length in feet and drill Width, 8 feet (or rows) ...	,, ,,	,, ,,	90·75	136,125	108·9
Length in links	,, ,,	lb. per acre	100,000	100,000	100,000
,, ,, ...	,, ,,	tons ,,	44·64	44·64	44·64
,, ,, ...	,, ,,	bushels ,,	1,666·6	2,500	2,000
Length in links and drill Width, 8 feet (12 rows) ...	,, ,,	,, ,,	137·5	206·25	165

General rule for finding a divisor:—(1) When the area of the plot is known, divide square links or square feet to the acre by the number of lb. to the bushel or ton. (2) When the plots are in drill-widths, divide the square links or square feet to the acre by the number of lb. to the bushel or ton, and by the width of the plot in links or feet.

This work is best explained by examples, and below will be found the working of a set of examples taken from the College experimental yields.

It must be noticed, first of all, that the A and B lines of the slide-rule only are used, and to ensure that the correct number of tens will be allotted to the answer, it will be well to give the rule for slide-rule numeration. The lines are divided into two sections, and, to prevent confusion, only one section of the A line should be used. In this case, if the numbers are both on the same section of the B line, the difference of the whole numbers on the A line is the same as the difference of the whole numbers on the B line. If the numbers are on different sections of the B line difference of A integers equals difference of B integers plus 1, if answer on right-hand section; minus 1 if answer on left-hand section.

Examples.

1. A plot contains 13,500 square feet, and the yield is 454 lb. wheat. How many lb. per acre are there?

Set 13,500 on B to 43,560 on A, and opposite 454 lb. on B. Find the answer—1,465 lb. on B.

A	43,560	1,465
B	13,500	454

2. With the same area and yield, how many bushels to the acre?

Set 13,500 on B, to 726 A, and opposite 454 on B find bushel per acre.

A	726	24·4 bushels
B	13,500	454

3. The area of a plot is 25,652 square links, and the yield 765 lb. of wheat. Find the yield in bushels per acre?

A	1,666·6	49·6 bushels
B	25,652	765

4. With a drill 8 feet wide, and the length of the plot 756 feet, find the bushel per acre of barley from a yield of 124 lb. per plot?

A	108·9	17·9 bushels per acre
B	756	124

5. With a drill 8 feet wide, and the length of the plot 820 links, the yield per plot is 175 lb. of oats. Find the yield in bushels per acre.

A	206·25	44 bushels per acre
B	820	175

6. From a plot 5,385 links long, and a drill width (8 feet) wide, the yield is 150 lb. wheat. Find bushels per acre?

A	13·75	38·25 bushels per acre
B	538·5	150

This useful instrument may also be found of assistance to butter factory managers in compiling the number of lb. weight of butter contained in milk.

Example.—1,000 lb. of milk tests 4·0 per cent butter fat. How many lb. of butter are there?

4·0 test gives 22·52 lb. milk to make 1 lb. butter.—"Modern Dairying in Victoria."

Set 22·52 B to 1,000 A above 1 B, find 44·4 answer.

A	1,000	44·4
B	22·52	1

Rule for Slide-Rule Numeration.

If the first term is taken on the B line, the answer will be on the A line, and use only one section of the B line. If the first term is taken on the A line, the answer will be on the same section of the A or B line. The difference of the A integers equal difference of the B integers.

If the numbers are on different sections of the A line in the first case, or of the B line in the second case, difference of A or B integers equals difference of B or A integers plus one, if the answer is on the right hand section; minus 1 if the answer is on the left-hand section.—*Farmer and Grazier.*

UNITED STATES BUREAU OF FORESTRY.

The Bureau of Forestry, as a distinct division of the United States Department of Agriculture, was authorised by the last Congress, and $185,440 was appropriated for its maintenance. The appropriation for the previous Division of Forestry was $88,520; and for 1898-99 it had only $28,520. But this Division of Forestry made an assured success of practical forestry, and led to many improvements in forest management. Field work is to go on in seventeen States this summer, with 179 persons engaged in the work of the bureau, eighty-one of these being students, assistants, or young men who are preparing to take up the forestry as a profession. The matters studied are tree-planting, the relation of forests to the volume of streams, erosion, evaporation, irrigation, water supply, regulation of grazing lands, study of forest fires, &c.—*Engineering News.*

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1900.					1901.							
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
North.													
Bowen	6·76	0·12	0·31	0·05	2·30	17·25	6·23	8·26	4·75	0·94	0·19	0·10	6·36
Cairns	Nil.	2·44	1·52	1·61	4·19	11·53	22·09	14·93	8·87	13·18	0·57	0·89	2·53
Geraldton	Nil.	2·63	3·17	2·39	18·68	23·32	32·93	37·64	26·10	26·72	1·21	2·58	11·77
Herberton	Nil.	0·74	Nil.	3·11	4·01	8·25	4·16	10·95	2·87	3·80	0·18	0·64	2·53
Hughenden	Nil.	0·14	Nil.	0·10	0·61	1·62	1·41	2·82	1·74	3·48	0·03	Nil.	0·33
Kamerunga	0·03	1·42	1·98	1·28	2·38	15·91	22·36	13·09	9·57	13·18	2·09	2·60	1·94
Longreach	0·50	Nil.	Nil.	0·19	0·11	0·41	0·22	3·09	2·56	5·95	0·09	Nil.	0·37
Lucinda	0·08	0·44	1·33	0·88	2·48	31·80	24·76	15·78	9·16	8·63	2·89	2·17	5·89
Mackay	0·74	1·19	0·48	0·12	7·00	24·85	8·99	10·13	6·80	1·32	0·25	1·07	5·14
Rockhampton	0·92	2·52	0·53	1·15	0·68	0·49	8·26	5·53	2·84	0·79	0·24	2·29	3·04
Townsville	0·12	0·25	0·91	0·05	0·76	14·91	12·94	4·95	3·13	0·74	0·32	0·19	1·87
South.													
Barcaldine	1·63	0·03	Nil.	0·30	1·20	0·15	1·17	3·70	1·90	2·21	0·82	0·63	0·25
Beenleigh	1·06	1·90	0·26	2·80	1·49	5·99	4·30	11·44	4·17	4·55	4·15	1·34	4·49
Biggenden	0·98	3·07	0·87	1·65	0·06	1·11	2·55	6·19	6·35	1·47	1·60	0·74	2·81
Blackall	0·66	0·12	Nil.	0·29	0·17	0·29	0·90	2·28	3·96	3·80	0·90	0·55	0·44
Brisbane	0·79	1·52	0·14	2·48	0·55	3·43	2·96	11·70	3·10	2·29	3·29	1·31	3·71
Bundaberg	1·14	1·56	3·05	1·06	1·28	2·34	2·61	3·17	10·27	1·14	0·74	2·01	5·59
Caboolture	1·56	2·94	1·99	0·86	2·11	1·11	5·51	11·53	4·64	3·34	2·27	3·70	3·18
Charleville	0·13	0·59	0·13	0·19	1·13	0·19	0·22	1·10	2·61	3·28	0·93	1·27	0·92
Dalby	1·72	1·67	Nil.	1·77	3·37	2·89	0·44	4·77	3·12	1·12	3·59	2·83	1·66
Emerald	0·52	0·35	0·18	0·31	1·08	3·65	4·43	3·25	0·88	1·31	0·63	0·90	1·74
Esk	1·39	3·00	Nil.	1·35	1·80	3·99	3·15	8·36	4·11	1·78	2·45	3·01	3·03
Gatton College ...	1·33	2·81	Nil.	4·12	0·47	6·27	1·54	6·73	3·86	1·55	2·93	1·53	3·23
Gayndah	1·42	3·28	3·21	1·84	0·08	1·22	2·10	4·22	3·97	0·97	2·32	2·29	Nil.
Gindie	0·55	0·22	0·27	0·49	1·32	1·57	1·62	2·07	0·44	1·21	0·84	1·34	1·77
Goondiwindi	0·61	2·14	0·26	0·90	0·94	0·59	0·25	3·53	1·82	1·90	1·73	2·30	1·55
Gympie	0·84	5·67	0·18	0·84	0·47	2·57	3·10	18·56	3·89	3·38	2·82	3·40	3·39
Ipswich	1·17	1·37	0·01	3·93	0·47	2·09	2·88	7·01	3·38	1·43	3·16	0·97	2·47
Laidley	1·08	2·39	Nil.	4·55	0·63	4·01	1·58	6·94	3·81	1·47	2·54	2·00	5·32
Maryborough	0·57	3·55	1·22	0·68	1·18	5·03	5·51	11·76	5·58	4·09	2·22	3·07	5·02
Nambour	1·81	4·15	0·52	1·91	2·19	4·25	9·13	18·01	3·33	7·25	3·33	6·80	4·42
Nerang	1·08	2·79	0·26	3·02	2·92	4·26	4·22	14·91	5·12	5·42	5·34	0·79	5·41
Roma	1·05	0·77	0·66	2·20	3·28	1·13	0·11	1·77	1·11	1·11	2·66	2·26	0·98
Stanthorpe	1·50	3·98	0·23	2·17	2·16	1·94	0·80	3·95	2·13	0·77	2·74	1·52	4·22
Taroom	2·9[illegible]	2·26	1·47	0·45	0·29	1·40	0·10	3·15	1·88	1·70	2·19	2·74	2·34
Tambo	0·59	0·19	Nil.	1·87	1·52	0·52	0·51	1·66	2·75	2·85	1·47	0·73	0·74
Tewantin	1·97	5·78	1·48	0·74	0·95	7·04	14·18	20·33	11·70	12·20	5·45	8·34	4·61
Texas	0·66	2·68	0·35	2·67	3·33	1·29	1·35	4·58	1·46	1·10	1·87	1·00	3·06
Toowoomba	1·35	1·95	0·43	2·42	2·40	3·60	1·76	6·84	6·59	1·04	3·57	2·22	5·57
Warwick	1·11	2·72	0·13	2·01	2·50	2·90	0·26	5·56	2·91	0·82	3·47	1·57	5·74
Westbrook	1·18	0·60	0·04	4·59	1·35	1·88	0·73	4·37	3·38	0·74	3·48	1·64	6·50

CLEMENT L. WRAGGE,
Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER (duty free).—Australian, 107s. 7d.; Danish, 116s. 2d.; Canadian, 68s. to 104s.

CHEESE (duty free).—American, 34s. to 49s.; Canadian, 40s. to 50s.; New Zealand, 46s. to 52s.; Australian, 46s. to 52s. per cwt.

SUGAR (duties, raw, 2s. to 3s. 10d.; refined, 4s. 2d. and ¼ per cent.).—Refined, £17 10s. to £20 per ton; German beet, 88 per cent., 7s. 7d. per cwt.

SYRUPS (duty, 2s. per cwt. and ¼ per cent.).—Finest, 14s. 6d. to 16s. 6d. per cwt.

MOLASSES (duty, 2s. per cwt. and ¼ per cent.).—6s. to 8s. 6d. per cwt.

RICE (duty free).—Rangoon, £9 to £16; Japan, £14 to £22; Java, £21 to £26; Patna, £20 to £24 per ton; Queensland (Pimpama Island), valued at £18 10s. in the London market.

Coffee (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, small to good middling, 40s. to 75s.; good to finest, 80s. to 118s.; peaberry, 60s. to 127s.; Santos, 28s. to 48s.; Mocha, 68s. to 80s.; Jamaica, finest, 90s. to 106s. per cwt.

Arrowroot.—St. Vincent, 1¾d. to 4½d.; Natal, 5½d. to 7½d.; Bermuda, 1s. 6d. to 1s. 9d. per lb.

Wheat.—South Australian, white, 28s. 6d.; Victorian, 28s.; New South Wales, 26s. 9d.; New Zealand, white, 29s. 3d. per 480 lb.; Duluth, red, 32s. 6d.; Manitoba, red, 32s. 6d. per 496 lb.

Flour.—Australian, 19s. to 21s. per 280 lb.

Malting Barley.—English, 26s. 6d. to 27s. 6d. to 32s.; Californian, 25s. to 27s.; New Zealand, 25s. to 28s. per 448 lb.

Oats.—New Zealand, 23s. 6d. to 26s. per 384 lb.; Canadian, 16s. 9d. to 17s. per 320 lb.

Split Peas.—40s. to 50s. per 504 lb.

Ginger (duty free).—Calicut, good medium, 75s. to 96s.; medium, cut rough, 45s. to 65s.; small, cut rough, 30s. to 34s.; Japan, rough, 32s. to 33s.; Jamaica, good bright, 66s.; middling to fair, 40s. to 47s. per cwt.

Pepper.—Capsicums, 15s. to 80s.; chillies, 35s. to 50s. per cwt.

Tobacco.—The sample of Victorian strips reported to have been valued at from 6d. to 7¾d. per lb. has not met with ready sale. American: Thomas H. Edwards and Co., Liverpool, report the following prices:—

Leaf.	1901.
Western—	
Common Export ...	— @ —
African Export ...	— @ 5 @ 6½
Short Trade ...	3 @ 4
Medium to good Trade...	4½ @ 6
Burley ...	6 @ 7½ @ 8
Virginia Dark—	
Common Export ...	none
Short Trade ...	— @ 3½
Medium Trade ...	4 ,, 5
Good to fine Trade ...	5¼ @ —
Virginia and Carolina Bright—	
Common or Semi-bright ...	4 @ 6
Medium or Mixed ...	6½ @ 8 @ —
Good to fine ...	9½ @ 11 @ 15

Stocks on hand, 30th June: Leaf, 18,680 hogsheads; strips, 73,416 hogsheads; or 95,000,000 lb. Texas (Queensland) strips has nearly all been sold to Brisbane manufacturers at 6d. per lb. Five tons of fine leaf grown on the State tobacco farm will shortly be placed on the market. It is valued at 7d. per lb.

Wine.—Prices remain as quoted last month.

Green Fruit.—Apples, Australian, 15s. per case; pineapples, 3s. to 5s. each; oranges, common, 15s. to 17s.; medium, 17s. 6d. to 18s.; fine, 22s. to 24s.; finest selected, 25s. to 32s. per 420; Sydney oranges, 14s. per case; lemons, finest selected, 18s. to 21s. 6d. per case; bananas, 10s. 6d. to 15s. 6d. per bunch.

Cotton.—Clean upland, 6⅝d. to 7d. per lb.

Cotton Seed.—£7 per ton.

Cotton-seed Oil Cake (decorticated).—£5 to £5 2s. 6d. per ton.

Cotton-seed Oil.—Crude, £21 15s. to £22 per ton.

Linseed.—56s. per 416 lb.

Linseed Oil.—£32 per ton.

Olive Oil.—£30 to £40 per tun.

Eating Oil.—£50 per tun.

Linseed Oil Cake.—£8 to £8 5s. per ton.

Manila Hemp.—£25 to £30 per ton.

New Zealand Hemp.—£24 per ton.

Wool.—The first series of this season's London wool sales opened on 2nd July with an average decline of 5 per cent. for merino and 10 per cent. for crossbred. On 26th July the fourth series closed with merino ½d. higher, and fine crossbred par to ½d. lower; medium crossbred, ½d. to 1d. lower. The fifth series opened with an average advance of 5 to 7½ per cent. for merino. Fine crossbred, average advance, 6 to 7½ per cent.; common ditto, average advance, 5 per cent. Prices were very firm on 20th September. Greasy fleece brought 9½d. per lb. at auction. Queensland scoured fleece sold at 1s. 7d. per lb.

Frozen Meat.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

	Sept 14.	Sept. 21.
New Zealand Mutton. (Crossbred Wethers and Merino Ewes.)		
Canterbury	3⅞d.	3⅞d.
Dunedin and Southland	3⅝d.	3⅝d.
North Island	3½d.	3½d.
Australian Mutton. (Crossbred and Merino Wethers.)		
Heavy (over 50 lb.)	3⅜d.	3⅜d.
Light (under 50 lb.)	3⅜d.	3⅜d.
River Plate Mutton. (Crossbred and Merino Wethers.)		
Heavy	3½d.	3½d.
Light	3⅛d.	3½d.
New Zealand Lambs.		
Prime Canterbury (32 lb. to 42 lb.)	4⅝d.	4½d.
Fair average	4⅜d.	4⅜d.
Australian Lambs.		
Prime (32 lb. to 40 lb.)	—	—
Fair average	—	—
New Zealand Frozen Beef. (Fair Average Quality.)		
Ox, fores (100 lb. to 200 lb.) ...	2¾d.	2½d.
Ox, hinds (180 lb. to 200 lb.) ...	3⅞d.	3½d.
Australian Frozen Beef. (Fair Average Quality.)		
Ox, fores (100 lb. to 200 lb.) ...	2½d.	2½d.
Ox, hinds (180 lb. to 200 lb.) ...	$3\frac{9}{16}$d.	3½d.

These prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotation is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

Bacon.—Irish, 67s. to 72s.; American, 49s. to 54s.; Canadian, 54s. to 87s. per cwt.

Hams.—Irish, 74s. to 100s.; American, 54s. to 58s. per cwt.

Hides.—In fair demand at last quotations.

Tallow.—Beef, fine, £29 10s.; mutton, fine, £31 15s.; medium, £28; beef, medium, £27 10s. per ton. Fine mutton lots brought £32 15s. per ton.

Agricultural Patents.

PATENTS ACCEPTED.

Splitting and Defibrating Ramie.—Class 39 (11 Figures)—5968: Eyssen-Packer Defibrator Company, of No. 60 Grand street, Jersey City, Hudson, New Jersey, United States of America (assignees of Warren Seymour Belding). "Machine for Defibrating Ramie and other Fibrous Plants." Dated 16th April, 1901. (Drawings on application; specification, 36s.) This machine treats each stalk singly; the stalks are hand-fed between guides to gripping and guiding rollers consisting of a lower fluted roller and an upper V-grooved roller (spring-supported), in which both the thick and thin parts of the stack will be fairly centred and guided to the splitting roller. The splitting roller has a circular knife-edge which is opposed to a deep-grooved roller, so that one side of the fibrous shell with the pith and wood is split; behind the splitting edge is a plough-like spreader or guide, which opens out the stalk and conducts it between flattening rolls, the lower of which also carries a travelling belt, on which the split stalk is spread out in a ribbon form with the fibrous shell uppermost and the refuse underneath; the ribbon next passes under several rapidly-rotating cleaning brushes, and is then gripped at the forward end (by travelling belts on rolls) and dragged over a self-tipping scraping-knife, whereby the refuse is cut or scraped below a deflecting belt and the shell of fibre is carried forward in a straight and cleaned condition between the gripping rolls and delivered at the exit. The short tips which are gripped and escape the scraping-knife are afterwards cleaned by thrashing. (37 claims.)

Cleaning Pan for Sugar Juice.—Class 30 (2 Figures)—5922: James William Strachan, of 35 Bartley street, Brisbane, engineer. "Cleaning Pan for Sugar-cane Juice." Dated 5th March, 1901. (Drawings, 5s.; specification, 6s.) The juice (if previously treated) must not have been heated above 206 degrees Fahr. This pan consists of an elongated shallow trough with splayed sides and ends. There are longitudinal steam pipes along the bottom, arranged so that the heat is greatest down the centre and diminishes also from the centre to the sides. The juice is run in at one end. The ebullition causes the scum to collect on the splayed sides, from which it is removed intermittently, although the juice may run continuously. (2 claims.)

Degreasing Wool with Carbon-tetrachloride, and Plant.—Class 21 (5 Figures)—5975: Georges Peltzer, of the firm of Peltzer et Fils, of Rue David, Verviers, Belgium, manufacturer. "Process and Apparatus for Extracting Fatty Matters from Wool." Dated 26th April, 1901. (Drawings, 10s.; specification, 13s.) The wool may be previously washed with water to remove soluble salts and earthy matter, after which it is treated with carbon-tetrachloride, either by passing the wool through the solvent or by forcing the solvent through the wool, in either case means being used to prevent waste by evaporation. The apparatus consists of modifications of ordinary woolscouring plant, in which provision is made for the constant submersion of the CCl_4 under a bath of water, or its enclosure in vapour-protecting shields. The solvent is squeezed out of the wool by rollers, and recovered at the bottom of the vats, its high specific gravity facilitating this operation; the fat is separated from the solvent by distillation. (5 claims.)

Wire-straining Lever and Cutter.—Class 35 (3 Figures)—5764: Henry Arthur Green, of Dubbo, New South Wales, mechanic. "An Improved Wire-strainer and Cutter." Dated 12th November, 1900. (Drawings, 2s. 6d.; specification, 2s. 6d.) This hand-lever appliance has a jamming dog pivoted at one end, which grips the wire against a folded part of the lever-bar; the tail of the dog forms a fulcrum used against the fence-post so that the pressure tightens the dog against the wire. After each pull of the lever the wire is temporarily jammed in the post with the usual tapered wedge. The folded edge of the lever is steeled and sharpened for cutting by impact, and the other end has holes for twisting wires. (1 claim.)

General Notes.

FIBRE IN GERMAN EAST AFRICA.

It is expected that the cultivation of fibre will be very profitable. There are at present over 800,000 *Fourcroya gigantea* plants and 750,000 *Agave sisalana*. Compared to other products, the cultivation of fibre is very simple and inexpensive. The only fear is that, owing to over-production, the price will fall considerably, and the article will become a drug in the market. Within the last few months Fourcroya hemp has fallen from 33s. to 25s. per cwt. The first Sisal Agave bulbs were introduced by the German East Africa Company in 1891, forty-six being brought from Yucatan and planted in the Kikogwe Estate. From the original forty-six plants over 700,000 have been obtained in nine years. At Kikogwe alone there are 640,000, covering an area of 1,000 acres, whilst 65,000 have been distributed amongst the German East Africa Company's other estates. The Sisal Agave at Kikogwe only lives for five or six years, when allowed to go to seed. When the leaves are regularly cut, the life of the plants will probably be considerably longer. The annual produce of each plant is about forty leaves, or $2\frac{3}{4}$ lb. of dry fibre. During the year under review a sample of 100 cwt. of fibre was sent out and sold for 50s. per cwt. — British Acting Vice-Consul at Dar-es Salaam, ***British Trade Journal.***

[A few years ago it was attempted to form a small company in Brisbane to commence the cultivation of Sisal hemp. But the usual apathy in such matters caused the project to be abandoned. Meanwhile Germany steps in where Queensland fears to tread, and the above is the result.—Ed. *Q.A.J.*]

CANDIED PEEL.

To candy orange and lemon peel, cut the fruit lengthwise and remove the pulp. Soak the peels in salt and water for three or four days, then boil in fresh water till soft. Place on a sieve to drain. Make a syrup of 1 lb. of sugar to 1 quart of water, and in this boil the peels again till clear. Then make a very strong syrup by mixing sugar with just sufficient water to melt it. Boil the peels in this slowly till the sugar candies, then take them out, strew powdered sugar over them, and dry either before the fire or in a cool oven.

A WONDERFUL PLOUGH.

Dr. Gatling, who invented the Gatling gun, has now given to the world the idea of a motor plough. This marvellous invention enables one man to plough 30 acres a day. A St. Louis company has taken up the invention, and our American cousins may be depended upon to work it for all it is worth.

RICE BRAN FOR FEED.

Professor W. R. Dodson, of the A. and M. College, Baton Rouge, La., is quoted as saying: Rice bran and rice polish, by-products from the rice mills, form excellent feed, comparing favourably with corn. A ton of rice bran contains approximately 240 lb. of protein. A ton of corn contains only 194 lb., a difference of 25 per cent. in favour of rice bran. On the other hand, corn contains 21 per cent. more carbohydrates. Rice bran is quoted at \$8·50 per ton. This would represent corn at about 25 cents per bushel. But as it is a by-product its price will vary with the price of corn, for which it more nearly serves as a substitute.

COTTON IN EUROPE.

Cotton is to be grown in the southern part of Hungary, where the climate is said to be favourable to its cultivation. Bounties will probably be paid to cotton-planters.

NEW USE FOR EUCALYPTUS LEAVES.

In India the leaves of the eucalyptus are used by the railway authorities for making a decoction employed for cleansing the boiler of locomotives. The Government Botanical Gardens at Saharanpur (Allahabad) derive an annual income from the sale of the leaves for this purpose. The price is 3s. per maum (25 lb.).

NOXIOUS WEEDS IN NATAL.

With a view to the eradication of noxious weeds in the rural districts of Natal, the Department of Agriculture in that colony has commissioned the Curator of the Botanic Gardens at Durban to have a certain number of drawings of noxious plants and descriptions thereof printed for the purpose of distributing them amongst magistrates and road overseers. It is hoped that this action may lead to a better knowledge of the noxious weeds of the colony—more especially of the "burr" class—and, as a result, to their extermination.

HONEY IN NEW ZEALAND.

New Zealand honey has been bringing £42 10s. per ton in the London market. There can have been no ti-tree flavour about that honey. The Poverty Bay settler who realised this price, gets 90 lb. of honey per hive annually.

BUNDABERG AGRICULTURAL SOCIETY.

Whilst there are three societies in Bundaberg representing the interests of canegrowers, horticulturists, farmers, and the industrial classes, the Isis Agricultural Association with two branches at Childers, also one society at Gooburrum, one at Kolan, and one at North Isis, Bundaberg has for some time had no society such as has just been formed under the patronage of the Hon. the Secretary for Lands, Mr. W. B. O'Connell, M.L.A. A very successful meeting on the 24th August last resulted in the formation of a very strong committee, and the rules of the Maryborough society were adopted *in globo*, subject to any necessary alteration the committee might make. Mr. T. W. Walker announced that he had received 110 promises to join, and of these fifty-four were farmers. The secretary was not appointed at the meeting, and, up to the time of publication of this issue, we have not been notified of any appointment having been as yet made.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

COST OF A SUGAR-MILL.

Capitalist, Brisbane—

Question.—Having made inquiries as to the total outlay required to erect a sugar-mill capable of making 6,000 tons of sugar in a season, and of laying down tramlines for the haulage of purchased cane, I have received so many different estimates that I should be glad if you would give me the actual cost of one of the central mills.

Answer.—We cannot do better than give you the actual outlay on the Mossman Central Mill as per the director's general report for 1900. By this it appears that the—

	£	s.	d.
Mill and crushing machinery cost ...	£41,835	18	4
7½ miles of portable line	2,844	15	2
500 cane trucks	4,311	0	6
2 locomotives	1,940	6	0
Buildings	3,236	6	3
	£54,168	6	3

To this must be added the cost of purchased cane. The price given by the Mossman Company is 13s. 6d. for untrashed cane and 14s. for trashed cane per ton.

Salaries and wages would have to be provided for about fifty Europeans for the handling of some 60,000 tons of cane and, say, 6,000 tons of sugar. Firewood, sugar-bags, haulage to wharf, repairs to machinery, and a host of minor expenses have to be provided for. With a good season, 6,000 tons of sugar, worth, with the bonus, about £60,000, would go far towards recouping a portion of the initiatory expenditure, which would not be less than between £60,000 or £70,000.

Small mills with obsolete machinery do not pay.

The Mossman directors have expended, besides the above amounts, over £22,000 on permanent tramways and £900 on a sawmill plant and buildings. They reckon depreciation for 1900 at £6,026 15s. 6d.

QUANTITY OF WHEAT PER ACRE.

J. Ackers, Central District—

Question.—I have determined to go in for wheatgrowing next year, but know very little about it. How much seed must I sow per acre?

Answer.—Professor Lowrie, principal of Rosworthy College, South Australia, answers the question as follows:—The quantity of wheat it is advisable to sow per acre varies so much with climate and conditions that I do not think any precise statement is possible. The quantity depends on (*a*) the character of the wheat, whether large or small berried; (*b*) the habit of growth or tillering habit; (*c*) the character of the soil; (*d*) the freedom from weeds of the farm; and (*e*) climate. I cannot agree with those who practise extremely thin seeding. My own practice on this farm is to sow from ¾ of a bushel up to 65 lb. per acre. If intended for hay, I sow 1¼ bushels per acre. The thinnest seeding could be practised on new land with somewhat light rainfall. If oats, I generally sow from 2 to 2½ bushels per acre, and of barley 1¼ to 1½ bushels per acre.

GARLIC.

J.M., Indooroopilly—

Question.—I have a quantity of garlic plants, about 8 inches high. What must I do to cause them to produce large bulbs and prevent them seeding?

Answer.—Garlic does not, properly speaking, produce bulbs like the onion. It differs from the latter in that onions produce a solid bulb, whilst garlic is an agglomeration of membranous scales, in the axils of which are ten or twelve small bulbs, or "cloves," as they are called. To prevent the plants running to leaf, bend the stalks downwards and cover them with earth. Twisting the stalk will prevent it seeding.

BEEKEEPING.

W.A., Towers Mr. H. R. Stephens, Toowoomba, furnishes the following replies to W.A.'s questions:—

Question 1.—Where can I obtain the best up-to-date book on bees?

Answer 1.—The A B C on Bee Culture. Post free, 6s. I can supply that and also other works.

Question 2.—Where can I obtain the necessary appliances for beekeeping, such as hives, sulphur bellows, extractors, foundation, &c.?

Answer 2.—I can supply above. A sulphur bellows is not used in beekeeping, ordinary smoke being quite sufficient.

Question 3.—Which hives are the cheapest and most simple?

Answer 3.—As I make my own hives, &c., and believe in simplicity, they cost me less than American, and are perfectly neat and satisfactory.

Question 4.—Is it possible to make a frame hive myself? Can you give me a design for one?

Answer 4.—Quite possible, and almost all other appliances. Will give any information, but you could work better from a pattern hive.

Question 5.—What North Queensland tree is the best honey producer to plant? Most of the timber here has been cut for firewood.

Answer 5.—Uncertain, but it is generally considered unprofitable to plant for honey alone. The spider plant, lucerne, clover, borage, are all good bee plants. Tree lucerne is also a handsome shrub when in flower, and bees work on it well. Orange trees yield also.

Mr. R. J. Cribb, Milton Apiary, also answers W.A.'s questions, as follows:—From the questions asked, I take it they are from a person desirous of starting beekeeping, and instead of answering each question separately, I consider he will be helped better by visiting an up-to-date apiary, and having obtained Root's "A B C of Bee Culture" and a catalogue of beekeepers' supplies from any one or all of the following firms—viz., B. G. Wilson and Co., Queen street; F. Lassetter and Co., Elizabeth street; or Mr. H. L. Jones, Goodna. I can supply these.

Questions 1 and 2, 4 and 6 will be answered by one or all of above catalogues and Root's "A B C of Bee Culture," 5s.

Question 3.—The cheapest hive for a beginner is one made by an up-to-date firm, and costs from 6s. 6d. to 12s. 6d. each.

When a properly made hive is obtained, temporary hives may be constructed from kerosene cases, by knocking them to pieces and then re-constructing them according to the measurements (inside) of the pattern. (*Rebate the ends before nailing together.*)

Question 5.—A few carpenter's tools—viz., saw, hammer, square, rebate plane, and jackplane.

Question 7.—The best trees to plant for bees anywhere are those that are useful for other purposes besides honey, such as farm-crops, maize, lucerne, pumpkins, peas, beans, &c.

COMPARATIVE VALUES OF JUICE TANK LIME AND QUICKLIME.

H. Simpson, junior, Hon. Sec. Island Farmers' Progress Association—

Question 1.—What are the comparative values of juice tank lime and quicklime for agricultural purposes?

Mr. J. C. Brünnich, Chemist to the Department of Agriculture, furnishes the following replies:—

Answer 1.—The composition of juice tank lime (filterpress cake) may vary considerably, and contains from 15 to 30 per cent. of calcic oxyde or quicklime. If obtained from sugar-mills in which phosphoric acid is used for the process of clarification, this waste product becomes much more valuable on account of the phosphate of lime it contains.

Question 2.—What amounts should be applied per acre to an alluvial soil per year?

Answer 2.—A yearly application of from 10 cwt. to 1 ton of quicklime (varying in accordance with the quality of the land) should be sufficient, and this would correspond to an application of 2 to 5 tons of juice tank lime or filterpress cake.

Question 3.—In what form is it best applied?

Answer 3.—Juice tank lime is best worked up into a proper compost by mixing with megass, wood ashes, other mill refuse, and molasses. Compost of this description has been applied in quantities from 10 to 20 tons per acre with beneficial results.

PLANTING SEASONS AT GOONDIWINDI.

Goondiwindi.—A correspondent asks us to supply some information as to the times and seasons for planting and sowing various crops in the Goondiwindi district. Mr. P. McLean, Agricultural Adviser, has kindly prepared the following table, which will, we think, furnish all the information required:—

Crop.	Season to Plant.	Crop.	Season to Plant.
All grasses	March and September	Lucerne	March to July
Apple	August	Maize	August to January
Apricot	July	Mangelwurtzel	August and September
Artichoke	May to September	Nectarines	July
Asparagus	August to October	Oats	March and April
Barley	March and April	Onions	April and May
Beans	May to December	Panicum	January
Beets	February, March, September	Passion fruit	September
		Peach	July and August
Broom millet	August to January	Pear	July and August
Cabbage	March to September	Persimmon	July
Cape barley	January to March	Plum	July
Carrot	Nearly all seasons	Potatoes	August and March
Cauliflower	February and March	Rape	September
Celery	September	Raspberry	June
Chestnut-trees	August	Rhubarb	August and September
Citrus fruits	June to August	Rye	March and April
Clover	March	Sorghum	August to January
Cow pea	September to November	Strawberries	February to March
Cucumbers, melons	August to November	Sweet potatoes	September to December
Pumpkins, marrows	August and September	Teosinte	August to January
Culinary herbs	February	Tomatoes	July and September
Field peas	April to August	Tobacco	September
Fig-trees	August	Turnips	March and April
Flax	March to September	Vetches and tares	August to February
Grapes	July	Walnut	August
Gooseberries	July	Wattle-trees	August
Imphee	August to January	Wheat	March to June.
Kafir corn	August to January		

GRIPES IN HORSES.

W. Cradock, Gympie—

Question.—Can you give me a good recipe for gripes in a horse?

Answer.—Here are three given by "Vet," in the *Farmer and Stock-breeder:* The following are useful and well-tried ones, but it should be borne in mind that gripes arise from different causes, and need different treatment. The chief distinction is as between flatulent and spasmodic colic or gripes, and of stoppage. In the flatulent variety, such as we get in summer among farm horses, coming in hot from work and blowing themselves with more greenmeat than they can digest, we want remedies which will disperse the gas; while in spasm of the bowel on winter keep, and without any blowing up of the flank, rapid control of the pain, by anodynes and stimulants, is what is most needed. In stoppage nothing will answer without an aperient to shift the cause of the colic. Bearing all these things in mind, and for a general gripe drink, I recommend the following:—

Aromatic spirit of ammonia (sal volatile), 1 fluid oz.
Tincture of opium, 1 oz.; or chlorodyne, ½ oz.
Aloes, ½ oz. in solution.

The chemist will make this up to 6 oz. or 8 oz. (as aloes are not very soluble), and when administered it should be put in ¾-pint of water or thin gruel.

Another:—

Spirit of turpentine, 3 fluid oz.
Spirit of camphor, 1 oz.
Tincture of opium, 3 oz.
Linseed oil, 1 pint.

Mix for one draught.

Another:—

Sweet spirit of nitre, 1 fluid oz.
Sulphuric aether, ½ oz.
Tincture of aconite, 15 drops.
Water, 1 pint.

Before choosing one of these remedies, the diet and general state of the horse should be considered, as an aperient may be of vital importance on the one hand, or absolutely inimical to the animal's life on the other. For a stock drench to keep for emergency, and for anyone to be allowed to use it, I recommend the first on the above list.

SMALL BURR GRASS.

G.N., Yeulba.—The seed heads you sent for identification are those of the small burr grass, *Tragus racemosus* (*Lappago racemosa*, Willd.), a small annual grass often met with on dry, stony knolls, where, in winter and early spring, it produces a fair amount of feed. At Jimbour it was looked upon as a useful fodder grass and, although a burr, harmless to wool. It sometimes attains a height of 1 foot.

VALUE OF COCOANUT-TREES.

Northern Farmer.—The number of nuts a cocoanut-tree will produce in a season varies from 100 to 400. A bunch will average nine nuts. Sixty nuts will make a gallon of oil, and the gallon is worth from 3s. 6d. to 4s. 6d. Therefore the yearly value of a tree may be put down on an average at 8s. In Jamaica, it is stated by the *Journal of the Jamaica Agricultural Society*, eight or nine inland grown cocoanuts go to a quart of oil, which means that from thirty-two to thirty-six nuts produce a gallon. It all depends on soil, climate, and situation. We have no data to go upon from Queensland cocoanut-trees.

The Markets.

AVERAGE TOP PRICES FOR AUGUST.

Article.		AUGUST. Top Prices. £ s. d.
Bacon	lb.	0 0 7½
Bran	ton	4 10 0
Butter, First	lb.	0 0 11¼
Butter, Second	"	0 0 8
Chaff, Mixed	ton	3 15 0
Chaff, Oaten	"	5 15 0
Chaff, Lucerne	"	3 14 4½
Chaff, Wheaten	"	4 6 3
Cheese	lb.	0 0 6¼
Flour	ton	7 13 9
Hay, Oaten	"	5 5 0
Hay, Lucerne	"	2 17 6
Honey	lb.	0 0 2¼
Rice, Japan (Bond)	ton	16 10 0
Maize	bush.	0 2 10
Oats	"	0 3 1¾
Pollard	ton	4 12 6
Potatoes	"	8 0 0
Potatoes, Sweet	"	2 13 9
Pumpkins	"	1 13 9
Sugar, White	"	17 10 0
Sugar, Yellow	"	16 15 0
Sugar, Ration	"	12 15 0
Wheat	bush.	0 3 4¾
Onions	cwt.	0 17 0
Hams	lb.	0 0 9
Eggs	doz.	0 0 7½
Fowls	pair	0 3 0¾
Geese	"	...
Ducks, English	"	0 4 6
Ducks, Muscovy	"	0 5 5¼
Turkeys, Hens	"	0 6 8¼
Turkeys, Gobblers	"	0 15 7½

ENOGGERA SALES.

Article.	AUGUST. Top Prices. £ s. d.
Bullocks	9 15 7½
Cows	6 1 8
Wethers, Merino	0 16 6
Ewes, Merino	0 12 3¾
Wethers, C.B.	0 18 8¼
Ewes, C.B.	0 13 9
Lambs	0 12 10½
Baconers	2 10 0
Porkers	1 14 6
Slips	0 15 10

Orchard Notes for October.

By ALBERT H. BENSON.

Keep the land well cultivated, and, if dry, see that it is well stirred, but not turned. Attend to the disbudding of all young trees, for, if superfluous growths are checked now, they are converted into fruit-wood, and the vigour of the tree is thrown into those shoots which are to form the future branches of the tree. Disbud all vines, rubbing out all superfluous shoots, leaving only as many canes as the vine is strong enough to mature fruit to perfection on.

Sulphur all vines to prevent oïdium, as, if there is any muggy weather during the month, this disease is sure to make its appearance. Where Black-spot is present, spray the vines with Bordeaux mixture; and if caterpillars are troublesome as well, then add 1 oz. of Paris green to each 2 gallons of Bordeaux mixture, and both pests will be destroyed by the one spraying. When using Bordeaux mixture, there is no necessity to use sulphur for oïdium, as the Bordeaux mixture answers equally as well. Don't spray when the vines are in blossom; but with varieties that are shy setters it is often a good plan to sulphur when in blossom.

The nursery should be carefully attended to; where not already done, the ties of all grafts should be cut and the scions should be trained so as to make a single upright stem. Where buds have been put in, they should be started by cutting back the stock sufficiently to cause them to grow, but the stock should not be cut hard back all at once, but by degrees, always leaving a portion of the stock above the bud to tie the young shoot to. Plant pines and bananas during the month, selecting suckers from healthy plants and from plants that are good croppers, and that produce good fruit, as a careful selection of suckers always pays well. Continue the treatment for Maori or Rust Mite of the orange recommended in the Notes for September; and where orange bugs, either the green or bronze, are present, destroy every mature insect that can be found, so as to prevent them breeding, as the killing off of the first crop will materially lessen their number for the season. Hand-picking, though slow, is probably the best remedy, though, before the insects are fully grown, large numbers may be destroyed by driving them on to the main branches of the tree and sweeping them off with a broom on to a cloth, from which they can be gathered and killed. Take every possible precaution against the fruit fly by destroying every infested fruit that you can. If there are maggots in cumquats or any other fruits, destroy everyone, as the cleaner the sweep that is made of the first crop of flies the less trouble there will be throughout the season. Where Scale Insects have been introduced on young trees into clean districts, every care should be taken to keep the pest from spreading; and in cases where the young trees are badly affected, it will pay the grower to destroy them at once, as the first loss will be the least. Where leaf-eating insects of any kind are trouble-some—such as caterpillars of all kinds, the larvæ of the fig beetles, or the false ladybirds that attacks all kinds of cucurbitous plants, potatoes, &c.—they can be readily destroyed by a spraying of Paris green, 1 oz. to 10 gallons of water, with lime added in as large a quantity as can be got through the nozzle of the pump without choking, as this will tend to make the poison stick on better to the leaves, branches, or fruit.

Farm and Garden Notes for November.

Field.—Under favourable circumstances wheat harvesting may be begun in some districts. The splendid growing season of August and September, combined with frosts which checked the too luxurious growth of the wheat, have resulted in the promise of a most abundant harvest. The total area under that cereal this year being far greater than that of last year, it is not too much to anticipate a yield 25 per cent. greater than the crop of 1900. There is much land under malting barley, and we repeat our previous instructions concerning the harvesting of this grain. Allow it to ripen in the field before cutting, but cut as soon as the grain is hard, in order to avoid scattering. Exercise great care in stooking, for, if showers should come on during harvesting operations, the grain left on the field will be in danger of becoming discoloured. The barley must be thoroughly dry before being placed in the stack, and, after stacking, six week or two months should be allowed to elapse before threshing. Oats for hay should be cut when mature, but not ripe, as the plant is then in its most nourishing condition. Destroy the caterpillars, which will now be numerous on tobacco plants, and top the plants back so as to throw all the strength into the leaves intended for crop. Sow imphee, setaria, teosinte, sorghum, maize, Kafir corn, &c. Do not let the weeds make headway. Earth up all growing crops requiring it, and keep the ground loose among them. Plant sweet potatoes, yams, earthnuts, turmeric, and ginger.

Kitchen Garden.—Our notes for this month must necessarily be somewhat of a repetition of those for September, to which recipients of the *Journal* are referred. For the benefit, however, of those who have only now begun to subscribe to the *Journal*, we give the following:—French or kidney beans may be sown in all parts of the State; also Lima beans, which love hot weather. Sow the dwarf kinds 3 feet apart and 18 inches between the plants, and the climbing sorts 6 feet each way. Velvet beans require very strong trellises to run on. The kitchen garden should be deeply dug and reduced to a fine tilth. Give plenty of room, both in sowing and transplanting, or the crops will be drawn and worthless. Thin out melon and cucumber plants. Sow lettuce, radish, cucumber, pumpkins, rosellas. Tomatoes planted out last month should be well watered and mulched during dry weather. Transplant for succession in calm, cloudy weather.

Flower Garden.—Winter flowering plants are now going off rapidly. In some gardens dahlias are well above ground. These should be staked. Plant out any bulbs which were stored in a moist spot, but keep the weaker bulbs for future planting. This will ensure flowers in the autumn. The flower garden will be in full bloom. Give a little top-dressing of some fertiliser. Sow antirrhinum, balsam, zinnia, summer asters, summer chrysanthemums, calliopsis, nemophila. Give frequent waterings of weak liquid manure to chrysanthemums, and syringe them overhead every afternoon. Allow no suckers to grow until the plants have ceased flowering. Take up narcissus, but do not store them. Plant them at once in new situations.

Extracts from the Annual Report of the Secretary for Agriculture for the Year 1900-1901.

In April this year the State and the Department suffered an irreparable loss by the death of my predecessor. Both as a representative of the people and as a Minister of the Crown Mr. Chataway had earned for himself honourable distinction, as was evidenced by the respectful and affectionate references to him in Parliament during the current session, and the unanimous and enthusiastic appreciation of his services to agriculture expressed at the recent conference of farmers at Bundaberg. It must be mournfully confessed that, like others of our public men of late, he shortened a life invaluable to the State by devoting himself too assiduously, in defiance of medical advice, to public affairs.

The first item in the following table shows the cost of administering this Department during the year under review, with like information concerning the preceding year. A comparison of the amounts expended during the two years on the more important institutions connected with the Department is added thereto:—

—	1899-1900. £ s. d.	1900-1901. £ s. d.
DEPARTMENT OF AGRICULTURE.		
Gross Expenditure ...	62,666 17 4	48,812 9 4
Revenue ...	5,540 0 2	6,829 16 7
Net cost ...	£57,126 17 2	£41,982 12 9
AGRICULTURAL COLLEGE.		
Gross Expenditure ...	8,062 8 1	6,731 8 8
Revenue ...	1,823 3 0	2,940 12 7
Net cost ...	£6,239 5 1	£3,790 16 1
WESTBROOK.		
Gross Expenditure ...	974 12 5	1,051 5 0
Revenue ...	87 16 8	121 15 8
Net cost ...	£886 15 9	£929 9 4
HERMITAGE.		
Gross Expenditure ...	*1,981 18 1	880 5 6
Revenue ...	106 4 11	165 0 7
Net cost ...	£1,875 13 2	£715 4 11
BIGGENDEN.		
Gross Expenditure ...	668 8 6	400 3 10
Revenue ...	43 15 11	6 14 6
Net cost ...	£624 12 7	£393 9 4
GINDIE.		
Gross Expenditure ...	2,322 7 1	1,101 0 6
Revenue ...	247 12 3	94 3 6
Net cost ...	£2,074 14 10	£1,006 17 0

* Including £760 paid for land.

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—	1899-1900.	1900-1901.
	£ s. d.	£ s. d.
KAMERUNGA.		
Gross Expenditure	700 4 7	743 3 4
Revenue	Nil.	9 19 6
Net cost	£700 4 7	£733 3 10
BOTANIC GARDENS AND GOVERNMENT DOMAIN.		
Gross Expenditure	2,682 2 0	2,498 2 7
Revenue	72 7 6	72 12 6
Net cost	£2,609 14 6	£2,425 10 1

* * * * *

In the numerous books and pamphlets on agriculture generally that have appeared during the last few years the dominant note is one of admiration for the progress of the industry in continental Europe. That progress, apparently, is taking place in countries differing widely from each other in area, soil, climate, race, government. Yet differ as these countries may in those respects, it is agreed that all of them have adopted substantially the same measures to advance agricultural interests, and that to those measures this progress should be mainly attributed.

A brief consideration of these measures cannot fail to be of interest to us, who inhabit a country which is not inferior in agricultural resources to the most favoured portions of Europe, and which will yield easily and abundantly every useful plant of Britain and of Ceylon, and of every land between them. It might be well, too, to inquire to what extent and with what results these measures have been adopted in Queensland.

The two causes assigned for the satisfactory condition of agriculture in the more progressive States of Europe are the extent to which co-operation and combination prevail among the farmers, and the extent to which the principles of scientific tillage are diffused among them.

With reference to the former cause it seems safe to assert that in most of these countries there is hardly a farmer who is not a member of a district agricultural club. The district clubs are organised into provincial associations, which in their turn are federated into grand national unions. These societies, or other societies arising out of them, generally initiate or encourage co-operative undertakings for the production of agricultural manufactures, for the purchase and sale of agricultural requirements and produce, for the establishment of agricultural banks, for mutual insurance against loss of crops by storms and of stock by disease. As a rule, these co-operative societies do not owe their origin to State action; but, where necessary, the State has incorporated them by statute, or has appointed an organiser to assist in establishing them.

Queensland, too, has many agricultural societies, which, however, differ in their aims and methods from those that have just been described. In two or three districts, indeed, some attempt has been made to bring a few of the neighbouring societies into union; but in the main the operations of each society are confined to its own locality, and there seems to be no machinery by which it may be brought to combine readily for any purpose with any kindred society. In fact, vicinity is as likely to produce discord as to produce unity; for there have been instances of two societies only a few miles apart being at open war. No central body, empowered to speak on behalf of all or even a majority of the societies, has yet been called into existence. It has to be added

that beyond holding shows and bestowing prizes for exhibits not exclusively agricultural, these societies have done little or nothing to reproduce here, in any fulness, the continental model.

Perhaps in no field of action do the continental societies exercise such a potent influence as in the legislative sphere. A tendency to centralisation is undoubtedly a marked feature of some continental governments, but that feature has little chance to assert itself very prominently where agricultural interests are concerned. Speaking generally, none of these government ventures on legislation affecting such interests without ascertaining the views of the farmers regarding that legislation. Usually those views are obtained through consultative councils composed mainly of representatives of the agricultural societies. To those societies, moreover, is in many cases entrusted much of the administrative work of the Department of Agriculture. In Denmark, indeed, the principle of devolution is carried so far that the Danish Minister of Agriculture appears to have no duty beyond taking care that no farm product of an inferior quality is exported. There can be no difficulty in understanding why continental tariffs in general favour, in intention at least, the farmer, when it is remembered how mighty is the pressure he can bring to bear on the ruling agency. "It is worth noting," says a recent writer, "that foreign States refrain from burdening their agriculturists with taxes for revenue. They make the foreign importer contribute to their revenue, and by so doing at once relieve their people from taxation and protect their industrial enterprises." This result may be held to indicate ignorance of the true principles of political economy; but it at least shows the power of perfect and far-reaching organisation on the part of the farmers.*

In Queensland, on the other hand, it is well nigh impossible to learn quickly and decisively the opinions of the farmers on a matter peculiarly concerning them. There being no central organisation to speak on their behalf, the only way the Department has of ascertaining those opinions is by addressing all the societies individually; and even then it is not easy to know how far any society really voices the sentiments of the district it is supposed to represent. Assuming, however, that all these societies really possess the necessary delegated authority, the effects of a departmental appeal to them for advice are by no means encouraging. Last year, for example, the late Minister wished to know the opinions of the farmers generally as to the administration of one of the most important statutes committed to him. The question was put to 126 societies. Of these 126 societies only 48 sent replies, and these replies were so vague or conflicting that the matter has remained to this moment unsettled. It is true that once in every year the Department has an opportunity of learning the views of the farming community on some of the more pressing agricultural problems. Once in every year, at the invitation of the Department, is held a conference of representatives of most of the agricultural societies of the State, at which conference papers are read and discussed, and views expressed which are not without effect on subsequent administration. One lesson taught by all these conferences is that extensive as Queensland is, and occupying as she does an area as large as that of all the European States together in which agriculture has attained a very high degree of development, her farmers, however widely separated they may be physically, have common aims, common interests, and common difficulties. The latest of these conferences was held at Bundaberg, and was beyond all doubt the most interesting and instructive of the series. It was also the most valuable of them; for among the resolutions it adopted was one appointing a committee to frame a constitution for a Queensland chamber of agriculture. The committee has completed its work; and probably, before this report can be tabled, the chamber will have commenced its labours. Those labours, however, will not be conspicuously successful unless the new institution is enthusiastically supported by the agricultural societies. It might be advisable, therefore, to appoint some competent person to report on the

* The latest triumph of the Agrarians is the new German tariff. See the *Times* of 30th July, 1901.

condition of those societies, and on the causes which have hindered their developing to the same extent as kindred associations elsewhere. At least one such person is known to the Department; and his services might be obtained for the purpose without cost to the State, as a very small fraction of the amount paid in subsidies to these societies would cover the whole expense of the inquiry.

While, hitherto, our farmers have not shown in an eminent degree that genius for combination with its resulting co-operation and the individual self-effacement involved, so characteristic of the continental races, Queensland, in the direction of industrial education, has recognised the value of continental ideals, and has made determined efforts to attain them. Not that her achievements in this respect can compare with, say, the elaborate agricultural education system of France, where agricultural training "begins in the rural primary schools with the simplest facts of agriculture, extends through every phase of practice and theory in special schools, and culminates in a National Institute, where the highest forms of agricultural instruction are given by a staff of the first men of science of France." But thanks to the strong hands and true which founded it, we have an Agricultural College which would take a high place even in France, and has no superior among the kindred institutions of Australasia. The good work it is doing, both as a seminary for our youths and as a model farm for their elders, meets with general recognition. Not the least pleasing fact about it is the circumstance that most of its "old boys" betake themselves for a livelihood to agriculture, and that some of them are occupying positions of trust and responsibility connected therewith. It should be added that the institution is highly popular, and that room cannot be found for all who desire admission.

Owing to the facilities placed in their way by the Railway Department, hundreds of farmers visit the College in parties in the course of the year, and learn there much that is valuable to them respecting effective machinery, modern methods, breeds of cattle, the most profitable crops, and the most serviceable manures. A similar purpose is served by our experiment farms, all of which are capably conducted, and promise, under the skilful direction of the agricultural adviser, to be even more useful in the future than they have been in the past. This is particularly true of the experimental plots in each, which are under the care of the specialists of the Department. These officers, it should be said, are carrying out their duties, as far as practicable, after the manner of the travelling instructors of the more advanced European countries. They are constantly in the field, keeping themselves in touch with the farmer, helping him to cope with his difficulties, tendering him the best advice available, and showing him how to prepare his products in the most attractive way for market. For this last mentioned work special praise should be given to the strenuous and successful efforts of the instructor in fruit culture and his assistant, both of whom are entitled to the warmest gratitude of the fruit-growers of this State.

* * * * * *

The seed time of our agricultural education system is so recent that it is, perhaps, too soon to look for the harvest. One result, however, of this diffusion of technical knowledge is that almost everywhere the farmer is sensible of the value of scientific tillage, and is eager to master and apply its principles. Indications are not wanting, too, that on the whole agriculture is advancing, as the subjoined notes on some of the principal crops will show.

It is true that one important branch last year gave no evidence of progress. Our greatest agricultural industry at present is the sugar industry. About one-fifth of all our cultivated land is under sugarcane, and about three-fourths of the value of our agricultural exports must be credited to sugar. It is therefore not pleasant to have to record the heavy loss this great industry suffered

chiefly from drought last year. The area under cane declined from 110,657 acres in 1899 to 108,535 acres in 1900; the acreage of cane crushed from 79,435 acres to 72,651; the yield of sugar from 123,289 tons to 92,554 tons; the export from 109,046 tons to 62,843 tons; the shrinkage in money value being, at export values, £500,000 at least. The Registrar-General's figures for 1900 show that the capital invested in sugar mills in Queensland was £2,815,076, the value of the product £1,188,693, the number of mills 66, and the white persons employed therein 3,105. In consequence of the failure to obtain the royal sanction to the necessary legislation, approval could not be given to two proposed mills, for the erection of which assistance under the Sugar Works Guarantee Act had been sought. Improvements to existing mills were approved, however, to the amount of nearly £2,000. The total sum advanced to date under the Acts is £498,000; of this amount £11,459 has been paid, leaving £487,341 still due. Since the last report of this Department was tabled, Dr. Maxwell has established his Sugar Experiment Bureau. In him Queensland has secured the greatest specialist of his class in the world; and it is believed that whatever ills may have befallen the Queensland sugar industry through unskilful husbandry and antiquated methods will soon be removed if his teachings are accepted and acted upon.

Much more encouraging are last year's figures relating to wheat. The area under that crop for grain rose from 52,527 acres in 1899 to 79,304 acres in 1900; the quantity yielded from 614,414 bushels to 1,194,088 bushels; the average yield per acre from 11·70 bushels to 15·06 bushels; the money value from £92,162 to £179,113. The largest yield of wheat per acre was in the Dugandan district, where it reached 24½ bushels; the district showing the largest area under wheat was that of Allora, with 21,378 acres. In 1900 only 77 acres showed signs of rust as against 5,610 acres in 1899. It is to be noted that during the last fifteen years the acreage of our land under wheat has increased sevenfold; but there is room for even greater development, as we do not produce more than a-third of the wheat we consume. According to the Registrar-General, in 1900 the number of flour mills was 16, the flour made 23,347 tons, its value £182,240, and the number of persons employed in its manufacture 196; 32,478 tons of flour, valued at £269,678, and 722,547 bushels of wheat, valued at £113,426, were imported.

STATEMENT showing the AVERAGE YIELD of WHEAT per ACRE in the various STATES of AUSTRALASIA.

	WHEAT. Bushels per Acre.
Queensland	15·53
New South Wales	9·95
Victoria	8·07
South Australia	4·69
West Australia	10·95
Tasmania	19·05
New Zealand...	24·61

The maize-grower had quite as favourable a year as the wheat-grower experienced. The area cultivated increased from 110,489 acres in 1899 to 127,974 acres in 1900; the quantity yielded from 1,965,598 bushels to 2,456,647 bushels; the average yield per acre from 17·79 bushels to 19·2 bushels; the money value of the crop from £343,979 to £429,913. As in the case of wheat, the local supply of maize did not equal the demand, and 247,449 bushels, valued at £42,388, had to be imported. The largest yield of maize per acre was at Cairns, where it exceeded 40 bushels. The district in which the largest area was under maize was Warwick, where it amounted to 10,146 acres; Toowoomba coming second with 9,512 acres.

STATEMENT showing the ACREAGE of the UNDERMENTIONED CROPS during the YEARS 1899 and 1900.

Crops.	Acreage. 1899.	Acreage. 1900.
	Acres.	Acres.
Sugar-cane	110,657	108,535
Wheat, Grain	52,527	79,304
Maize "	110,489	127,974
Barley—		
Malting, Grain	6,011	6,302
Other "	1,463	1,231
Oats "	714	385
Rice "	319	271
Tobacco	745	665
All Other Crops	137,821	132,730
	420,746	457,397

The following table shows the number of acres under crops at the State Farms in 1899-1900 and in 1900-1901:—

Farms.	Acreage under Crop. 1899-1900.	Acreage under Crop. 1900-1901.
	Acres.	Acres.
Westbrook	150	150
Hermitage	109	158
Biggenden	22	15
Gindie	134	156

Thanks to the efforts of the departmental experts, fruit-growing is being established on a more satisfactory basis; superior and more suitable varieties are being cultivated; insect and fungus pests are being encountered with the most effective remedies. In grapes the production increased from 3,230,627 lb. in 1899 to 3,634,949 lb. in 1900; the area under bananas increased from 5,802 acres to 6,215 acres; under oranges, from 2,324 acres to 2,882 acres; under mangoes, from 245 acres to 411 acres; under strawberries, from 87 acres to 121 acres; under apples, from 132 acres to 238 acres. The export trade increased from £93,187 to £104,385. The Department has spared no effort to keep the local orchards free from pests, and to exclude all infected fruit and plants coming from abroad. The officers whose business it is to perform this invidious work have done their duty fearlessly and well, and with very little friction, considering the extreme methods they have sometimes to adopt. The diseases noticed upon the fruit imported have been principally codlin moth, fruitfly, red scale, mussel scale, black brand, black spot, and San José scale. The codlin moth has been found in all consignments of apples from America and New South Wales, but in not one consignment of apples from Tasmania. This seems to indicate that in Tasmania a stricter watch is kept on fruit exports than in either America or New South Wales. It is gratifying to know that, owing to the stringent precautions taken with respect to imported grape-cuttings, Queensland has escaped so far a visitation from phylloxera. It is to be regretted, on the other hand, that no effective scheme for the extermination of another fruit-grower's enemy—the flying-fox—has yet been devised. The trade by Wallangarra during the apple season required the services of an inspector in addition to the staff usually stationed there. The Northern export trade, which consists principally of bananas, has received considerable attention. The fruit exported has been of a better quality, but unless improved storage is given by the shipping companies the decline in the trade will soon commence. Many persons formerly engaged in banana-growing are now cultivating maize and other crops of general farming, the change being directly traceable to the loss on shipments. The Department interested itself with some beneficial results, but there is much room for improvement before the facilities are equal to those of the steamers in the Fiji trade.

None of our agricultural pursuits seems to have made more rapid or enduring progress than the dairying industry. The very last of them to establish a footing, it is already one of the most important of them. In 1900 there were at work 53 butter and cheese factories, and 146 creameries, employing 595 persons. The output that year was 3,875 tons of butter and 886 tons of cheese, valued altogether at £658,177. Of that quantity of butter 620 tons were exported, as against 517 tons for the preceding year. A similar healthy condition of things is evinced in the allied industry of ham and bacon curing, of which the exports were valued at £31,067 in 1899 and £45,831 in 1900. Experts on the matter agree that everything which conduces to successful and profitable dairy-farming exists in Queensland, excepting proximity to the great markets for dairy produce, and that even this disadvantage would have no appreciable effects if Queensland had the shipping facilities enjoyed by the other States of the Australian Commonwealth. Determined efforts should therefore be made to have Brisbane included among the ports visited by the European mail steamers, which now make Sydney their destination.

The following table gives the estimated value of all the agricultural productions in 1899 and in 1900:—

—	1899.			1900.		
	£	s.	d.	£	s.	d.
Crops	1,436,832	10	3½	1,501,622	0	0
Dairy produce	686,972	15	8	658,177	1	4
Farm stock...	3,534,350	0	0	4,024,050	0	0
	£5,658,155	5	11½	£6,183,849	2	1

STATEMENT SHOWING the VALUE of the Undermentioned AGRICULTURAL EXPORTS during the Years 1899 and 1900.

Exports.	Value. 1899.	Value. 1900.
	£	£
Butter and cheese	49,646	52,252
Fruit	93,397	104,747
Grain—Wheat	106	74
„ Maize	22	363
„ Oats	91	...
„ Rice	8	...
Hay and chaff	1,256	1,500
Honey and beeswax	1,646	1,738
Meat (pigs and poultry only)	31,431	47,102
Sugar	1,163,010	669,389
Vegetables (fresh)	3,131	4,005
„ (preserved)	...	8
All other kinds of agricultural produce	23,758	22,993
	£1,367,502	£904,171

Some reference ought to be made to the efforts of the Department during the year to find a cheap and effective means of eradicating the prickly pear. Bunker's Hill, a portion of the State Farm at Westbrook, was the field of experiment, and the result was that the desired remedy was discovered, though it is not yet possible to state exactly what would be the cost of clearing ordinarily infested land by means of it. The land treated presented extraordinary difficulties, and was operated upon simply because it was a nursery of pear that was a constant menace to the Farm. Probably the cost of freeing infested land generally from the pest will be from £1 to £2 an acre.

D. H. DALRYMPLE,
Secretary for Agriculture.

Agriculture.

FIRST STEPS IN AGRICULTURE.

2nd Lesson.

SECOND STAGE.

By A. J. B.

I must now explain to you how our plant takes up solid food. It does it in exactly the same manner in which a little baby takes it up. When you see a baby sucking milk out of a bottle, you would not imagine that it is taking in solid food. You say the baby is drinking. But just think for a moment what solid things we get from milk. They are cheese, butter, and curds. What do you think would happen to the baby if it were compelled to eat curds and cheese? The baby would probably die, because it is not yet strong enough to eat anything solid. But all these solid foods are contained in the milk in another form. To show you that this is so, I take this glass of water, and stir into it a teaspoonful of salt, another of soda, another of sugar, another of alum. Now, I have stirred all these solid things into the water, I will allow it to rest for a while. What do you see now? Can you find the sugar, the soda, the salt, or the alum? Is the water not as clear as before? What has become of our solids? They have melted and become so mixed with the water that they cannot be seen. They are said to be "dissolved" in it. You must remember this word because I shall often have occasion to use it as we go on. Dissolved is a better word to use than melted, because when we melt any substance we still see the substance, no matter how much water we add to it. You melt things by the help of fire. Thus you *melt* butter, you melt lead to make bullets and sinkers for fishing. But you always have the melted substance before you, and if you allow it to cool, it becomes solid lead or butter just as it was before melting. But when you *dissolve* anything in water, the thing disappears and is so mixed up with the water that it becomes part of it, because it has broken up into very tiny grains quite invisible to your eye.

Well, the water sucked up by the plant contained solid plant food dissolved in it, and the plant is thus able to take it up in the water, just as the baby takes solid food dissolved by nature in the milk.

I have thus shown you that the plant obtains its food from three places. First from the seed; secondly, from the water; thirdly, from the soil. But the little plant is not satisfied with the food from the seed and soil. It wants another kind of food which can only be got out of the air. Look round you. Can you see the air? No, but you know it is there. You can tell that by waving your hand about, or by blowing at a lighted candle. You feel something cool moving over your hand. You see the flame of the candle blown about by your breath. It is the air in motion that causes this.

Now let us light a small fire. There, it bursts into flame. And see what a quantity of smoke goes up from it. Just watch that smoke for a little. It has gone you say. But where has it gone to? I will tell you. What you call smoke is really only steam and little tiny bits of the wood which have not quite burnt away. That smoke falls at last to the ground in the shape of water and charcoal, and goes to make plant food. Try and remember the word *carbon*. But besides the smoke there is something else which comes from the fire, and that is gas. This gas you cannot see. You know that when gas is turned on in a house, you can smell it, but you cannot see it, and it is because people cannot see it that often very terrible accidents happen when a lighted candle has been taken into a room full of gas which has escaped.

There are several kinds of gas, and that which escapes from a fire will not burn. It is very poisonous to human beings who happen to breathe it in a close room, but it is one of the principal plant foods.

In a future lesson I will tell you its name. For the present it is enough for you to know that a gas which comes from all fires, from candles and lamps, and even from your own breath, goes to form the different parts of a plant.

How does the plant take in the gas? It takes it through the leaves. In the last lesson I told you that every little leaf has hundreds of little mouths always wide open during the day to take in food, like the little birds in their nests, whose beaks are always opened as soon as their mother appears with something to eat in her bill.

All day long these little mouths are hard at work sucking in gas. Now, let us see what this gas does for the plant? To find this out, I must now tell you that when we talk about a plant we do not mean only a bean, or cabbage, or wheat plant, but also bushes, shrubs, grass, and trees of all kinds. Everything that grows in the soil or even on the bare face of a rock, the seaweed that clings to rocks on the sea shore, mushrooms, ferns, and everything that is not an animal or a mineral, belongs to what is called the *vegetable world*. The great gum-trees and ironbarks are vegetables, just as much as pumpkins and carrots, because vegetable only means something that grows from the soil. Well, then, our plant or vegetable has a root, a stem, branches, and leaves. The food taken up in the water from the soil, together with the gas produced by fires, the breathing of animals, and by other means, combines to build up the stem, branches, and leaves. But here I must tell you that a very strange thing happens. The gas sucked in by the leaves is mixed with another gas contained in the air. Both gases are taken in by the plant, but only one remains there. The other goes out on its travels again after having seen the first safely deposited in the plant, where it helps to build up its solid parts. If it were not for the plants, which take in such a vast quantity of this poisonous gas, there would be a great deal of sickness in the world. There are some countries where men soon became ill and died until gum-trees were planted in the unhealthy parts, and they drew in all the bad gases, and those places became quite healthy to live in. The gas which remains in the plant forms part of its food and becomes a portion of it, and can only be set free again by burning the plant or by its rotting away after it is dead.

Now we will leave the plant for the present, and try to learn something more about what we call the soil.

In the beginning, which was probably many millions of years ago, there was no such thing as what we now call soil. The world was at first nothing but a mass of rock and water. How then did all those rich fertile soils which you see everywhere throughout Queensland come into existence? They were produced in precisely the same manner as they are being produced now. The rocks, exposed to the air, to storms, rains, droughts, heat, and cold, gradually broke up. The great boulders were carried down into the valleys and gullies, where they were ground against each other by the rushing waters. Thus, gradually, they became reduced to fine sand, which spread over the low lands. The same thing happened on hillsides, where the rocks gradually decayed by the gas in the air acting upon certain parts of them, when they slowly broke up and formed beds of gravel and sand. Now, in all rocks there are some ingredients which largely go to make plant food, but they are useless to plants, because they cannot enter them until they are attacked by some other substance. They are like a gold or tin mine. The gold and tin are there, but, until someone comes along with plenty of money and machinery to dig them out, the mines might as well contain common stone for all the good they would do. There is a word used to describe these ingredients of a soil. They are said to be "dormant"—that is, "asleep." They want waking up, and the only way in which they can be waked up is by adding something to them which will stir them to activity—that is, make them "active." You have seen men making mortar for buildings. They have a heap of lime. The lime is required

for mixing with sand to make the mortar. But the lime, as it lies there, would not be of the slightest help to the mortar unless something were done to it. It is "dormant," and must be waked up. So the bricklayer throws buckets of cold water on it, and it immediately begins to get hot and to splutter and hiss and crumble to powder. Now the lime is ready to do its share in making the mortar. Now, just as the water acts upon the lime, so do certain gases act upon the dormant elements in the soil. They start them into life, and so alter them that they can easily be taken in by the little mouths of the plant roots.

Questions on Lesson 2.

1. How do plants take up solid food?
2. By what experiment can it be shown that invisible solids may be contained in water?
3. What is the difference between a "melted" and a "dissolved" substance?
4. Of what is the smoke of a fire composed?
5. What becomes of it?
6. What invisible body is produced by the burning of a substance?
7. What becomes of this body?
8. How do plants absorb it?
9. What does the word "vegetable" mean?
10. How do trees render a place healthy?
11. How is soil produced?
12. Do rocks contain plant food?
13. What are "dormant" ingredients?
14. How do they become active?

3RD LESSON.

SECOND STAGE.

I shall not say anything about the manner in which plants originally came upon the earth, first, because it would not be understood by you, and, secondly, because neither I, nor anybody else, know how the first seeds got into the soil or on to the rocks. But the plants came there, and we have been making them better every year, by learning how to improve the soil, and by cultivation. Now that we have arrived thus far in the consideration of the soil, I shall have to give you a few hard words to recollect. Yet they are not very hard nor difficult to pronounce. The first word is OXYGEN. Oxygen is a gas contained in the air, and it is very important to us as well as to soils and plants, for without it we could not live. But although you know that mince pies are nice, too much mince pie is very bad for you. So, too much oxygen would be bad for us; consequently it is mixed with another gas called NITROGEN. This nitrogen serves the oxygen in the same way that hot water serves strong tea—it makes it weaker, and as these two gases are mixed in a certain proportion, we receive just as much oxygen as is required to sustain life, and no more. You will perhaps think, "What has this to do with the soil?" Wait a little, and you will see that I could not explain the formation of the soil to you until you had first learned the composition of the air. Now, I have one more hard word for you, and that is CARBONIC ACID GAS. Whence does this get into the air? Take a piece of wood and burn it slowly, keeping it as much out of the air as possible. The wood burns, and after a certain time appears in the form of a lump of charcoal. Now this charcoal may be called a piece of *carbon.* (You learned this word in Lesson 2.) It is made in great quantities by men called charcoal-burners. They make great piles of wood and cover them first with grass, then with sods, and set them on fire. They watch these piles night and day, and whenever the fire breaks out, they put fresh sods on to exclude the air. In a few days, the fire has burnt itself out, and there remains a pile of black, brittle charcoal or carbon. Now, suppose the fire had been allowed to burn furiously in the air, all this charcoal or

carbon would have been burnt to a white ash, and a poisonous gas would have escaped into the air. This gas is CARBONIC ACID GAS, and is the one I told you about in a former lesson as entering so largely into the composition of the plant. Indeed, the black charcoal is nothing but the carbon which was taken up by the tree when it was growing, in the form of carbonic acid gas.

Now we have these three gases operating upon the rocks, in the first instance, to assist in producing *earth* or *soil.* Oxygen has an unpleasant habit of attacking any metal exposed to its influence. If you leave your knife out on the grass for a night or so, what do you notice if you are so lucky as to find it again? It is all "rusty," you say. That is the work of Mr. Oxygen, backed up by his friend Mr. Carbonic Acid. But you say you can rub the rust off. So you can, but that rust is a part of the metal of your knife, and if you left it too long in the care of our two friends, Oxygen and Carbonic Acid, you would, in the end, have no knife left. They would have eaten it completely up. But these two fellows, if they are troublesome in the way of damaging our knives and agricultural implements left out in the field, do splendid work in making a soil. They eat into the rocks, which slowly crumble under their attacks, and are themselves helped in the work of destruction by heat, by frost, and by the swelling roots of trees. The water collected in the holes, where certain minerals contained in the rock have been eaten away, freezes, and as water, in freezing, expands, the rocks are burst asunder. If ever you go to Europe and go into a pine forest in winter, when everywhere there is a covering of ice and snow, you will hear loud reports all round you. It is the sound of the trees bursting owing to the force of the frozen sap. (When water begins to freeze it takes up more room at first—that is, it swells.)

Well, then, I have shown you how a soil is created. I have also shown you that the soil so formed contains much of the food requisite for plants, and that it is rendered available for them by its being roused from a *dormant* to an *active* state, by means of the gases we have been just talking about, together with a few others, which I will not tell you of now, because in a future lesson, and when you are better able to understand me, I shall explain to you all about the various plant foods.

Let us now consider some of the soils which we can see around us. I mean, let us consider their fertility. By fertility, you must understand, is meant their holding more or less available plant food. Let us once more consider the scrub soils, and the soils of the Darling Downs, and of other great fertile plains in the State. In a sense you would be right in saying that these soils are fertile, but there are scrub soils which possess very little fertility, and there are lands on the Darling Downs which are actually injurious to plant life. However, let us agree that scrub soils, as a rule, are very fertile; but what makes them so? You remember, of course, what the scrub soils are composed of, and to further explain this I must get you to remember another word you have never heard before. That word is HUMUS, or ORGANIC MATTER. You have seen a heap of sand, or white quartz, or gravel? Very good. The name given to that is, *inorganic matter.* You have moved a heap of dead leaves or a bit of rotten bark, and have seen a dark-brown substance covering the ground beneath them? That is *organic matter* or *humus.* Now let us understand what is meant by the terms *organic matter* and *inorganic matter.*

Organic matter is so called because it is composed of the remains of plants or animals provided with "organs" of life, such as veins, pores, limbs, leaves, skin or bark, hair, &c.

Inorganic matter is that which has no life, which has no organs—such as rocks, metals, minerals, and precious stones. The former contains most of the necessary plant foods; the latter may contain some plant foods, but they are dormant, as I told you, until, as is the case of the lime, they are roused to activity by the addition of some other substance.

However, we will not now trouble ourselves about these dormant plant foods, but will let them sleep on and get to know something about the various plant foods contained in the organic matter we spoke about, and then you will

see how it comes about that the decay of leaves, roots, trees, &c., assists in rousing up the dormant ingredients in the soil. As you know, there is a great variety of soils, and all do not contain plant food in the same proportion. Pure sand, for instance, contains very little plant food; pure clay contains elements which are only of value to some plants, but few, if any, will thrive on mere cold, sticky clay. A light sandy loam, consisting of both organic and inorganic matter, is one of the best soils for many crops, whilst the dark soils, rich in organic matter, will furnish plenty of plant food for any crop whatever. Some of these latter soils are so "fat" that farmers do not sow wheat on them until they have been cropped several times with something else. The rich organic matter supplies such quantities of plant food and water, even in a dry season, that the wheat straw grows extremely coarse at the expense of the grain.

You now have a few more names to remember. Of course you have not forgotten oxygen, nitrogen, and carbonic acid gas. You must bear these names well in mind, because they will be constantly used in succeeding lessons.

Questions on Lesson 3.

1. What are (*a*) oxygen, (*b*) nitrogen, (*c*) carbonic acid gas?
2. Whence does carbonic acid gas get into the air?
3. Describe the action of oxygen and carbonic acid gas.
4. How is a soil formed by nature?
5. What is meant by the fertility of a soil?
6. What is organic matter? What inorganic?
7. To which of these does humus belong?
8. How is humus formed?
9. Do all soils contain plant food in the same proportion?
10. Name four soils in order of their fertility?

SECOND STAGE.

4TH LESSON.

In Lesson 10 you saw what manurial elements go to make up the structure of a plant, and how this was found out by ANALYSIS. You were also told that the plant derives food from organic matter contained in HUMUS and from the air, in the shape of NITROGEN, OXYGEN, CARBONIC ACID, &c.

Now, in order to keep up a proper supply of all these ingredients in the soil, farmers whose land is becoming exhausted adopt several ways of doing so. I should first tell you, however, that in reality there is no such thing as an exhausted soil. The plant food is there, but it is out of the reach of the roots of the plants, and requires to be brought up in some way or another to become available. Constant cropping has certainly removed the fertilising matter from the surface, and, such being the case, good crops cannot be produced; and, in this sense, the land is said to be exhausted. To restore the fertility of the soil, recourse is had to MANURING either with farmyard manure or with artificial fertilisers, or both combined, to FALLOWING, to ROTATION of crops, to GREEN MANURING, SUBSOILING, and DRAINING, IRRIGATION, &c.

We will consider all these in this and the succeeding primer from a higher standpoint than in the first book.

Now, let us ask what state the soil should be brought to to be considered fertile.

I have already explained to you the meaning of ACTIVE and DORMANT matter, terms used to denote SOLUBLE and INSOLUBLE matter. All soils, except peat soils, which do not exist in Queensland in the same form as in Europe, are formed originally from rocks, and consequently contain various minerals, such as lime, potash, silica, salt, iron, phosphoric acid. They also contain nitrogen, which is derived from the decay of organic matter in the soil, in addition to

what is drawn from the air. Now, of all the substances required by crops to favour their growth, potash, phosphoric acid, nitrogen, and lime are those which are the first to disappear by removing crops; but a very serious loss takes place in drainage water. Some plant foods, such as the CHLORIDES and NITRATES of soda and lime are very easily washed away; whereas potash, ammonia, and phosphates are kept from washing away by the RETENTIVE power of the clayey portions of the soil. You see, therefore, what a loss of plant food must occur during heavy, long-continued rains. During the great flood of 1893 the shallower soils on the banks of the Brisbane and other rivers were so washed out that on some previously fertile farms no crop would afterwards grow. The amount of nitrogen carried away from an acre by heavy rains has been ascertained to be about 40 lb., which is equal to the whole of the nitrogen required for a crop of wheat or barley.

Well, when the very soluble plant food mentioned has all gone from the surface soil, the land requires to be renovated and once more brought to a state of fertility, and the most natural thing to occur to you would be to supply that which is deficient in it.

GREEN MANURING is the simplest way of supplying organic matter or HUMUS. For this purpose cow peas, velvet beans, vetches, or any quick-growing crop are sown, and when they attain a convenient height they are ploughed under.

In hot climates such as ours this is a very simple way of improving a soil wanting in organic matter. The green plants rot very quickly and form humus, restoring to the soil not only all they took out of it, but also nitrogen and carbon they collected from the air. Plants grown for this purpose should be ploughed in before the seed ripens. Remember, the best plants for this purpose are LEGUMINOUS crops such as those mentioned, and you may include rape, vetches, lupins, and clover.

Now, what does this green manuring do for the land? First, it opens up and loosens the soil, then it supplies the nitrogen it has collected for the use of the coming crop, and then also certain salts in a fit state for plants to take up.

We will now consider FARMYARD MANURE, which, as has already been explained (10th Lesson, First Stage), is the best general manure, the only objection to it being that a large quantity of material is carted on to the field which is of little or no value to a crop.

Of *inorganic* substances it contains soda, lime, magnesia, potash, oxide of iron, silica, chloride, phosphoric acid, and carbonic acid.

Of *organic* substances it contains the various compounds of nitrogen forming ammonia and humic acids, which form the main portion of humus whence plants derive their nitrogen. Thus farmyard manure is a *perfect manure*, and affords the best means of preserving the fertility of the soil, for not only does it furnish a supply of plant food immediately available, but it leaves a supply in the soil which only gradually becomes available for a subsequent crop.

When farmyard manure is thoroughly well fermented or rotted, it is called "short" manure; when unfermented, the straw has scarcely undergone any change, and the name of "long manure" is given to it. Short manure is best applied to light porous soils, because its ingredients are more quickly taken up by the plants, and loss by drainage is to a great extent avoided, whilst clayey and stiff soils generally benefit more by long manure, whose ingredients are held by the stiff soil until they have undergone the changes which fit them for nourishing the plants. The long straw also helps to AERATE—that is, to admit the passage of air through the clay soil, and so helps to sweeeten and loosen it.

Great care is needed to prevent any loss of the liquid matter of the manure-heap, and also to prevent loss of VOLATILE elements, such as ammonia, by evaporation (volatile is applied to such substances as "fly away" in the form of gas).

Besides farmyard manure, there are several kinds of artificial manures which are valuable, not only for the plant food they supply, but also on account of the quantity of it furnished in a small bulk of material. These manures act very quickly, and great care is required in applying them, because they are meant not so much to manure the land as to feed the crop. Especially is this the case with those artificial fertilisers which contain potash, phosphatic, or nitrogenous ingredients. Some contain only one, and, according to the name of that one, they are called potash, phosphatic, or nitrogenous manure.

One thing should be borne in mind, and that is that there must be no wasteful application of such manures, because whatever the plants do not use is totally lost. A nitrogenous manure, such as nitrate of soda, should not be applied until the plants are actually asking for it, because, if they are not ready to take it up, it is washed away by the first rains.

Phosphates and potash manures, such as sulphate of potash, superphosphate of lime, basic slag (Thomas' phosphate), &c., may be applied when sowing the seed, as they are retained by fertile soils, which will to some extent also retain sulphate of ammonia.

PERUVIAN GUANO is an instance of a manure containing more than one ingredient of plant food. It contains a quantity of ammonia, nitrogen, and potash. It is the excrement of birds, and was formerly found in vast quantities on some islands (the Chinchas) off the coast of Peru.

Among other artificials may be named—

FISH GUANO, containing ammonia and phosphate of lime.

BONE MEAL.—Ammonia, nitrogen, and phosphate.

BASIC SLAG contains phosphoric acid.

NITRATE OF SODA is a most valuable fertiliser, very quick in its effect on plants, because the nitrogen it contains is very soluble in water, and is at once seized on by the plant. Its action has been described as much the same as a dose of smelling salts or a glass of spirits to a fainting person, and in the same way as too much spirits is injurious to a human being, so too much nitrate is injurious to the soil by exhausting it, but as it is only of value in an already fertile soil, containing all other needful plant food, this idea is incorrect.

It is very useful as a top dressing to growing crops.

SULPHATE OF AMMONIA is very soluble in water. It is rich in nitrogen, and may be used for all purposes to which nitrate of soda is applied.

Other manures are DRIED BLOOD from slaughter-houses and meatworks; HOOFS and HORNS: these are all nitrogenous manures, and, as they are almost insoluble in water, they give up their nitrogen very slowly in the soil. Soot also contains ammonia.

CHLORIDE OF SODIUM, or common salt, is useful in preventing the too rank growth of wheat crops. It is also of benefit to cabbage and mangel crops.

GYPSUM, or sulphate of lime, is suited to crops demanding much sulphur, such as turnips and clover. There is one valuable property possessed by gypsum. I told you about *volatile* gases in farmyard manure. Now, if you scatter gypsum on the manure heap it absorbs the ammonia, and thus prevents its loss.

As this lesson is already too long, we will bring it to a close by looking back to see what you have learned in it. You have been given several apparently hard names of artificial manures, but if you examine them carefully you will see that in reality you have only four ingredients which they contain. These are: NITROGEN, POTASH, PHOSPHORIC ACID, and AMMONIA. Oxygen, hydrogen, and carbonic acid you already know all about.

The main object of this lesson was to teach you how to bring an exhausted soil into a condition of fertility, but as we started on the method of manuring I thought it better to describe the various manures at once, and to take the subjects of fallowing and rotation in the next two lessons.

Questions on Lesson 4.

1. Name some of the methods of restoring the fertility of an exhausted soil.
2. Is a soil ever entirely exhausted?
3. What are soils composed of?
4. What ingredients of plant food first disappear by constant cropping?
5. What is the simplest method of supplying humus to a soil?
6. Name the plants best suited for green manuring.
7. What are the organic and inorganic constituents of farmyard manure?
8. What do you understand by "long" and "short" manure? To which soils is each best adapted?
9. What is the meaning of a volatile element?
10. Name some of the artificial manures, and state what you know of their ingredients.
11. How do nitrate of soda, ammonia, dried blood, hoofs, and horns act on a crop?
12. What property does gypsum possess?

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1901.

Farm.—During the month a great deal of work has been carried out in this department. Six and a-half acres of Kafir corn were harvested for a return of 220 bushels, but, owing to primitive appliances, at least 5 bushels per acre were lost. This crop may be considered a very profitable one, the grain being valuable food for cattle, pigs, and fowls, and under ordinary conditions a good yield may be obtained. Four and a-half acres of Giant sorghum were harvested, giving a return of 12 bushels per acre; a loss also occurred in harvesting this crop owing to primitive machinery. One acre of Amber cane was harvested, and, with the exception of a small quantity saved for seed, was fed to stock. The above crops were cut by the Osborne Harvester, the heads cut off by means of sickles, and threshed by the ordinary peg-drum thresher. Twenty-six acres of lucerne were cut and converted into hay, the average being 19 cwt. of hay per acre. Experimental plots of potatoes, area 1 acre, containing seventy-six varieties, were planted. Five acres of maize were planted, the method adopted being the "check-row" system—viz., in 4 feet check—thus enabling us to work the cultivator each way. The seed, consisting of "Piasa Queen," "Golden Beauty," and "Leaming," was planted 4 inches deep. Forty acres were ploughed and made ready for maize-planting. Three acres on the hill, near the Principal's house, were also ploughed and prepared for planting with sweet potatoes. A great deal of hoeing, scuffling, and cultivating was done, besides chaffcutting, woodcutting, haulage to and from Gatton. All the crops on the farm are now looking well, and promise high returns, especially the Cape and malting barley. The lucerne crops are also making vigorous growth, especially those recently planted. The root crops planted early in the season are now being harvested; the Swedes are the best I have seen growing in any part of Australia, the yield being at the rate of 48 tons per acre, many single turnips weighing as much as 18 lb. each.

Garden.—A large amount of work has been done in this department. Good progress has been made with both garden and orchard, and both are now in a most creditable condition.

There is also an enormous crop of white Belgian carrots ready for harvesting; 16 acres of land, known as the old pig paddock, are being cleared, and should be ready for the plough within the next few weeks. About 20 acres of land, adjoining the orchard on the hill, are being cleared by the students in the early morning. The rainfall for the month was 1·16 inches for five days, the heaviest fall being 0·56 on 25th September.

Dairy.—During the month the average number of cows milked was fifty-four head. 2,060 gallons of milk were treated at the factory; of this, 1,570 gallons yielded 681 lb. of butter; and 490 gallons gave a return of 530 lb. of cheese; 435 gallons were supplied to the dining hall; 230 gallons fed to calves; and 65 gallons used for domestic purposes. The increase in dairy stock was: Ayrshires, 2 head; Jerseys, 1; crossbreds, 3. The dairy herd were fed on natural grasses throughout.

Pigs.—The increase of pigs was as follows:—Pure Berkshires, 9 boars, 8 gilts; crossbreds, 30 head. Sales: Pure Berkshires, 6 boars, 5 gilts; Middle Yorks, 1 boar; Tamworth, 1 boar; large Yorks-Berks., 1 gilt. Six pigs were killed, and are being converted into bacon.

Mechanical Department.—One hundred and seventy feet of water pipes laid to connect main with kitchen. Four pairs of gates have been made by students to complete the enclosing of B Dormitory. Alterations, for the purpose of giving better ventilation, were made at the piggery. Several poultry-houses were completed. Minor repairs were effected at the stables and cowsheds. Gravel was carted, and used to fill up low places under kitchen building. We had the blacksmith for a few days only during the month; very little work was therefore done in the smithy.

Poultry.—Good progress is now being made with the poultry yards, and it is expected that they will be completed within the next four weeks; better results all round will then be obtained. The increase for the month was 120 chickens, including White and Silver-laced Wyandottes, Dorkings, Black and Buff Orpingtons, and Old English Game. The best layers are to be found in the Black Orpingtons, White and Silver Wyandottes, and Dorkings. An incubator—Harris and Dobson's "Eclipse"—has been purchased, and 150 eggs are now being hatched.

Thanks are due to the Hon. A. J. Thynne for presenting the College with a splendid Wyandotte cock: and also to Mr. Robert Hall for books for the library. The second and third year students have formed a debating class, from which good results have already accrued. Everything is now going on smoothly, and a good year's work is anticipated. Numerous applications have been received for admission to the College, and it is thought that next year the demand for accommodation will be very great.

DESTRUCTION OF PRICKLY PEAR.

Some little time ago, with a view to determining the efficacy of certain methods of destroying the prickly pear, which has now become a so serious and widely spread pest, especially in the districts west of the Main Range, the Department of Agriculture decided to carry out some experiments on a badly infested area. The agricultural adviser, Mr. Peter McLean, in order to make a thorough trial of the method decided on, selected one of the worst pieces of country in the Westbrook area. This was a steep, rocky hill, known as Bunker's Hill, situated near to and adjoining the Westbrook State Farm. The hill covers an area of about 145 acres of excellent land, thickly strewn with volcanic stone, parts indeed being so rocky that pick and shovel would have to be used if it were intended to plant the smallest tree. Nearly the whole of this area was covered with a dense growth of prickly pear, most of it of great height.

All arrangements having been made for the continuous carrying on of the work, five men were engaged on day-work. At the outset, it appeared an almost hopeless task to clear the hill, or any considerable portion of it, yet the work went steadily on, once a commencement was made, with the result that the entire hill, with the exception of about an acre yet remaining to be cleared, is covered with most luxuriant grass, intermixed with masses of beautiful wild flowers, when formerly nothing was to be seen but the unsightly prickly pear, through whose clumps neither man nor beast could force a passage.

How it was Done.

After several small experiments more or less successful, the Department decided on cutting down and spraying the pear with a mixture of arsenic and washing-soda in the proportion of 5 ounces of the poison to one gallon of water. To enable the men to work in comfort, they were provided with leather leggings reaching to the thigh. They were thus protected from the formidable spines and irritating hairs of the plant. Special mattocks were also made for the purpose. These have a narrow blade about 2 inches wide and 6 inches long, one end being for cutting, the other for chipping. Being very light, they were easier handled than the usual heavy double-headed mattock.

Water for mixing the spraying solution was brought up from the farm well. It will give an idea of the steepness of the road, when it is stated that three horses were required to cart up a two-hundred gallon tank of water to the site of the operations. The spray being prepared, is delivered from knapsack spray-pumps. The cutters attack the pear, chopping it down to the ground. The thickest leaves and the stem are then slashed with the mattock the stump is torn to shreds, but not extracted. Then the leaves are sprayed as they lie, care being taken that the whole surface is thoroughly wetted. The stump is also well sprayed. This is the whole operation. As may well be imagined, the cutting down of the plant amongst masses of rock such as occur on the rise of the hill is not so expeditious as on the less stony flats, half-an-acre being a good day's work in such localities.

The Result

is surprising. In from three to four days after spraying, the green, succulent, fleshy leaves, wilt and turn brown, finally drying up, and cracking under foot like dry pea or bean pods. Almost everywhere the spray has been applied, not a vestige of green pear remains. And not only are the leaves destroyed beyond recovery, but the spray has so permeated the stump to the very ends of the long roots that it and the roots are utterly rotted and turned into a rich humus. Here and there, more especially where the first commencement was made, a few leaves have taken root and thrown out shoots which, if left to grow, would soon multiply and spread, but on the hill, where the pear was thickest, and which part was worked at by men who were experienced at the work, the result is as stated—not a vestige remains, although some months have elapsed since the plants were killed. The whole area is now a valuable grazing property, the soil being of excellent quality, and producing abundance of succulent grass, wild carrot, and other herbs.

It must be borne in mind that the work was experimental, the site rough and generally steep, and the pear in solid masses. The carting of water was also a source of expense which would be obviated on more level land, to the extent that one horse only would be required, and that the solution could be made in quantities of 400 gallons at a time, and two spraying hoses could be attached to the tank, thus saving the labour and loss of time entailed by the knapsack pump.

It has been stated that the prickly pear will not grow on poor soil, and that its leaves, although they will throw out shoots if suspended in the air, will not grow if thrown on the ground. These are absurd statements which can be contradicted by ocular demonstration. The prickly pear will grow and thrive luxuriantly on the most barren soils. A leaf thrown on the ground will as surely strike root and produce new plants as will that of the air-plant (*Bryophyllum calycinum*). And even when a leaf has thrown out shoots and sent roots down into the ground, if it be turned over, the roots facing the hot sun, it will again send down roots from the lower surface and shoots from the upper. As one of the farmers said, "The pear seems to prefer a smooth rock or a sheet of galvanised iron." Certainly it will grow and thrive under the most adverse circumstances.

Singularly enough the spraying has no bad effect upon the grass, which seems on the contrary to derive additional vigour from the application. The

most delicate wild flowers also are seen blooming amongst the sprayed pear, and once the latter is got rid of, the growth of grass is astonishing.

The following preparations for destroying the pear were suggested by the chemist to the Department, Mr. J. C. Brünnich :—

1. *Sulphate of iron* (green vitriol), from 4 to 10 lb. being dissolved in 10 gallons of water.
2. *Hydrochloric acid* (coml.) dissolved in about 50 pints of water.
3. *Coal or gas tar*, making a spray by boiling 15 lb. resin and 8 lb. commercial caustic soda, for a few hours with 20 gallons of water and adding about 5 gallons coal tar, keeping the whole boiling and stirring, and adding while still hot another 20 gallons of water stirring vigorously to form an emulsion.
4. *Creosote oil* might be used as above.
5. *Sodium arsenite.*—4 lb. of white arsenic and 3 lb. washing soda in 1 gallon of water, boiled and stirred for half-an-hour, 5 oz. to 8 oz. to be used per gallon of water.
6. *Ammonium sulphocyanide.*—4 lb. ammonium sulphocyanide dissolved in 1 gallon water, 16 oz. of the solution to 1 gallon water.
7. *Lime sulphide.*—20 lb. quicklime dissolved in 10 gallons boiling water with 5 lb. flour of sulphur.
8. Various quantities of a strong solution of copper sulphate, sodium nitrate, and potassium chlorate, in addition to the arsenious mixture No. 5.

The Department finally decided on the Sodium Arsenite spray (No. 5), and this is what has proved so successful in the destruction of the pear.

It is said that a new specific has been found which will destroy the plants without their being first cut down. If this is so, and the Department is about to make experiments with it at Bunker's Hill, a great saving of labour and consequent expense will be the result.

CO-OPERATION FOR FARMERS.

Queensland farmers appear to have an insuperable objection to combining even for their own benefit. We have often shown how a number of neighbours, by co-operation, are enabled to buy implements, seed, household requirements, artificial manures, machinery, &c., at a considerable reduction on the price which each individual would have to pay acting on his own account. Just by way of proof of our assertion that co-operation or combination—call it what you like—is distinctly financially beneficial to a farming community and to each individual composing that community, we select from a score of articles on the subject the following one written for *Garden and Field* :—

Some years ago a political association of farmers was formed at Congupna, Goulburn Valley, Victoria. The farmers of the district became very interested in political questions, which were keenly debated to the improvement of the members as public speakers. But some farmers objected that "they got nothing out of the association." They considered it possible to form an association for trading purposes. Eventually five farmers joined together to form a co-operative association. None but producers could be members. No one could hold more than five shares, each valued at £1, payable in 2s. 6d. instalments. No dividends are paid on the shares, but instead a bonus on purchases is paid.

The association did £200 worth of business the first year, £1,100 the next, and last year their turnover was £4,200. Now there is a membership of 450 shareholders, and eleven branches of the association.

As cash purchasers of large quantities the association gets things much cheaper than the individual farmer could. A commission of 3½ per cent. is charged.

As examples of the benefits attaching to membership a farmer can save 22s. 6d. by purchasing a plough through the association. A harvester can be bought on two years' terms at a saving of £14. Last year 14 tons of twine were purchased; this year they expected to buy 30 tons. While prices had been cut very low they had an offer at a still lower figure. Machinery, bags, twine, tea, &c , are bought for members, and a lot is being done in insurance, life, fire, and stock, in which line enormous commissions were paid to agents. So far not a penny has been lost in bad debts. Branches are being opened in other parishes.

It is refreshing to find farmers banding together for their own good in this manner, and there is no doubt that the association must ultimately extend through the whole State, and take up business at present untouched.

We do not propose to reiterate all the advantages to be derived from co-operation, but will refer our readers who have the back volumes of this *Journal* to the following articles which deal exhaustively with the subject :—

Some Things we Need, Vol. I., p. 6; Co-operation in Marketing Fruit p. 113; Co-operative Association in New Zealand, p. 267; The Want of Cohesion, p. 412; Co-operation in South Australia, p. 414. Co-operative Bacon Factories, Vol. II., p. 88; Co-operation, p. 171; Co-operative Associations in France, p. 175; Co-operation—a Gain, p. 335; Co-operative Flour Mills, p. 336. Co-operative Farming in Germany, Vol. III., p. 189. Co-operation for Farmers, Vol. VI., p. 168. Co-operation, and How to make Practical Use of It, Vol. VII., Conference Supplement.

A NEW PASPALUM.

Paspalum virgatum is the name of a new and apparently, to judge from the price of the seed (5s. per oz.), a rare variety of this valuable fodder grass. The seed was obtained by Mr. Berthoud, manager of the Experimental Plots at Drakesbrook, Western Australia, from Paris. The growth is said to have been wonderful, the plants in one season attaining a height of 6 feet, and being over 5 feet in circumference. The stalks and leaves are fine, soft, and succulent. It is more upright in its habit of growth than the *dilatatum*, and is said to be equal to the latter in its drought-resisting qualities. Roots have been distributed to different districts. Mr. A. Crawford, writing on the subject of valuable grasses in the *Journal* of the Department of Agriculture of Western Australia (Vol. IV., Part 3, September, 1901), says that it seeded very freely at Drakesbrook. So far as he could find out, it is not obtainable from any seedsman in Australia, and the only catalogue he saw it mentioned in is that of Vilmorin, of Paris, from whom he obtained more seed this season.

Of the seed of *Paspalum dilatatum*, Mr. Crawford says it is to be regretted that there seems to be so much trouble in getting it to grow. One farmer informed him that he had sown 20 lb. of it, and not more than a dozen plants came up. It is very delicate after it first germinates, and is easily killed off by frost or wet for the first week or two. After that it is one of the hardiest of our grass plants. It will stand heat or cold, severe frosts, wet or dry weather. It seems to be more suited for loose, loamy, or sandy soils, where it can send its roots down to a great distance. In pure, white sand it sent its roots down 30 inches. Last spring Mr. Crawford planted out a number of roots in some of the stiffest clay he could find, clay that baked in the summer like a brick, and could only be broken up by a pick. At the end of the summer they were green and vigorous, although the ground was as hard as a metalled road. The roots had gone down 12 inches, and were very abundant, being about twice as large as the plant itself. The country that is now looked upon as utterly useless, except to grow banksias for firewood, can, he is satisfied, be turned into good pasture land that will carry great herds of sheep, cattle, and horses.

SEEDS THAT NEVER GROW.

In the beginning of the last month, in the course of a trip through the wheat districts of the Downs, we fell in with a farmer who was weeding what struck us as a very poor straggling plot of onions. On inquiry as to the cause of the innumerable "misses," he stated that he had bought 9 lb. of onion seed at 6s. per lb., had sown it all, but only about 2 lb. of it grew. This is by no means a solitary instance of the results of seed imported from the South as this lot was. Farmers cannot afford to lose money by receiving bad seed, in addition to the expenditure of labour and loss of time, but as long as dishonest seedsmen exist, so long will the unfortunate farmer be "had."

In connection with this matter, the *Sydney Mail* prints some amusing lines on

THE SEEDS THAT NEVER GROW.

I nearly hate the thought of spring,
With its delightful sun,
For well I know the mail will bring
A pack from Washington;
A little package duly franked,
No postage stamps to show,
And it contains those little seeds—
The kind that never grow.

Our good and zealous Congressman,
Remindful of our vote,
Upon his memorandum's page
Puts down a little note.
And when the proper time arrives
For us to wield the hoe
He sendeth us the little seeds—
The ones that never grow.

There's squashes with enticing names,
And cabbages, I wot,
So large that you would think that one
Would shade a garden spot.
So, with the pack from Washington,
You amble forth to sow,
With many a drop of sweat, the seeds
That never care to grow.

How often have I plied the rake;
How oft I've lounged about,
With eyes alert to catch the first
Signs of the coming sprout;
In vain, in vain; my hopes have fled,
My heart has filled with woe
About the seeds from Washington—
The seeds that never grow.

But yet each year my hopes revive,
Its spring reclothes the tree,
And to my homestead surely comes
The package marked "M.C.";
And, foolish-like, again I wield
The sprinkler and the hoe,
And, like a ninny, plant the seeds
That never care to grow.

They were sent to the *Mail's* correspondent by a seed firm in Philadelphia, and we think them worthy of a place in the *Journal*, as they are *à propos* of a proposal in the New South Wales State Parliament that seeds and plants should be distributed free, from experimental farms to the farmers. It was, however, shown to be a miserable failure in the United States, where the plan was tried.

QUEENSLAND CHAMBER OF AGRICULTURE.

One of the valuable papers read at the Agricultural Conference held last July, at Bundaberg, was by Mr. F. W. Peek, of the Logan Farming and Industrial Association, Beenleigh, on the desirability of forming a Queensland Chamber of Agriculture. A copy of the resolution of the Association affirming the necessity for such an institution was forwarded to every Society on the list published monthly in the *Queensland Agricultural Journal*, with the immediate result that forty-seven societies promptly responded, either promising support or asking for further information.

The late Secretary for Agriculture, the Hon. J. V. Chataway, gave the movement his full sympathy and support, and advised that the question be brought up at the Conference for discussion. This was done, and although several speakers considered the idea premature and advised delay, the majority favoured it, and the Chairman, the Hon. G. H. Dalrymple, present Secretary for Agriculture, whilst pointing out the inevitable difficulties, especially in relation to finance, considered that the moment was opportune for forming a provisional committee to at least set the ball rolling. At the close of the session the committee was formed and a number of farmers and planters signed the members' roll.

Since then Mr. Peek, who has acted as honorary secretary, has diligently followed the matter up, with the result that the Chamber of Agriculture is firmly established, and the first council meeting was held on Friday, 4th October, in the rooms of the National Association, Courier Buildings, Brisbane. The Hon. A. J. Thynne notified his willingness to accept the position of president. A large amount of preliminary business was got through. The secretary reported the funds to be in a satisfactory condition, and an account was opened in the Queensland National Bank. The Chamber of Agriculture is thus fairly started, and there can be no doubt that, under the guidance of an able council, it will be the means of much advantage to the farming and pastoral community generally. The acting secretary is Mr. F. W. Peek.

AGRICULTURE IN PUBLIC SCHOOLS IN FRANCE.

(From the Year Book of the Agricultural Department in the United States for 1900.)

* * * * The schools thus far described are given up entirely to agricultural teaching. There remains for discussion the public school system, in which agriculture is but one branch of the general course. Agricultural instruction is given in all French normal schools for men, and by the laws of 1879, 1887, and 1888 it has been made obligatory to teach in the rural elementary schools the elements of the natural and physical sciences, with their application to agriculture. The agricultural instruction in the primary schools is as follows:—

Elementary Primary Instruction.

Elementary Course (Pupils seven to nine years old).—First lessons in the garden and school.

Middle Course (Pupils nine to eleven years old).—Ideas appropriate to what the child has read; object lessons and excursions for the purpose of familiarising pupils with soils, fertilisers, tillage, and common implements.

Higher Course (Pupils eleven to thirteen years old).—More methodical instruction on tillage, implements, drainage, fertilisers of all kinds, sowing, harvesting, domestic animals, and bookkeeping; ideas about horticultural propagation, tree culture, and grafting.

Superior Primary Instruction.

Advanced Course for Boys and Girls over thirteen years old.—Practical ideas about vegetation, the duration of growth, and reproduction (by seeds, buds, grafts); different kinds of lands, manures and their use and rotation; the use of agricultural implements and machines; principal operations in agriculture, such as breaking up land, planting, transplanting, drainage, and irrigation;

principal crops of France and of the locality; diseases of plants, parasites; legumes, fruits, flowers; training and pruning fruit trees; care of domestic animals; bee culture.

About 3,400 of the rural primary schools have gardens attached to them. There are 160 superior primary schools, in which more than 15,000 pupils receive instruction in agriculture.

Official circulars have been issued by the Ministry of Agriculture suggesting the ideas and purposes involved in the agricultural instruction to be given. These direct that the instruction shall be addressed less to the memory than to the intelligence of the child. It should be based on the observations of facts in country life and on simple experiments with familiar objects, and designed to prove the scientific fundamental ideas of the most important agricultural operations. The children should learn above all things else the reasons for the operations rather than the manner of performing them. Still less should they be compelled to learn a list of definitions, precepts, or agricultural recipes.

The aim of the elementary instruction is to give the greatest number of country children that degree of elementary knowledge which is essential to enable them to read a modern book on agriculture or attend an agricultural meeting with profit; to inspire them with a love of country life so that they may prefer it to that of towns and factories; and to inculcate the truth that agriculture, besides being the most independent of all occupations, is also more remunerative than many others for industrious, intelligent, and well-instructed farmers.

In order to supply teachers with an adequate knowledge of the principles of agriculture, a course of agriculture was established in all the normal schools for men. It was not intended that the normal schools should be turned into agronomic institutes, but that agriculture should be given an honourable place in the school curriculum. It was desired to give the graduates of such schools an exact knowledge of the soil, the means of improving it, the methods of cultivation, and the general management of farms, gardens, and stables. According to the Minister for Education, it is sufficient if teachers in the elementary schools teach simply the elements of agriculture, give wise counsel in the neighbourhood, and, if necessary, combat effectually routine and prejudice. To accomplish this, the instruction given by the teacher should be accurate and clear. The ideas of the pupils should be rectified by visits to the best farms, by some laboratory work, and by frequent tests in the garden or demonstration field of the school. The object of the course in the normal schools is not to teach the business of farming, but to study the phenomena of life and the condition of its development, to inspire a love for the country, and to develop the natural tendencies of children to become interested in flowers, birds, &c.

In the normal school programme for teachers, two hours a week are devoted to agriculture, zootechny, and rural economy in the second year of the course, as follows:—

1. *Vegetable Growing.*—Study of the soil; the means of modifying its chemical composition and physical properties by fertilisers; irrigation; drainage; cultivation; rotation of crops and special crops, such as cereals, legumes, &c.
2. *Zootechny.*—Feeding of horses, cows, sheep, and swine.
3. *Rural Economy.*—Property in land; methods of exploitation and capital required; bookkeeping.

In the third year of the normal course one hour a week is devoted to fruit tree and vegetable growing, as follows:—General ideas of culture; planting and preparing the soil; work in the orchard and garden. It is expected that the professors will emphasise the methods and products of the localities in which the schools are located.

It was difficult in the beginning—and the difficulty has lasted well up to the present time—to initiate the teachers into the spirit of the new teaching in

the primary schools. Books on agriculture were placed in the hands of the pupils; agricultural rules, even though sometimes debatable, were taught as axiomatic truths; the memory rather than the understanding was consulted; and the learning of words rather than the observation of facts was made the basis of agricultural teaching.

FLOATING EXPERIMENT FARMS—HOW RUSSIA EDUCATES HER FARMERS.

Many years ago, when all the farmers on the banks of the navigable rivers of Queensland grew quantities of sugar-cane without possessing the necessary capital to erect crushing machinery, some enterprising men built a floating mill, christened her the "Walrus," and she used to steam up the rivers, stop near the bank at a cane farm, crush the cane, deliver the sugar, and proceed to the next place. It remained, however, for Russia to utilise her 60,000 miles of navigable rivers by building a fleet of floating farms. The Russian Government is keenly alive to the great importance of modern agriculture, and spends many millions a year in educating and assisting the farmers. Experts are sent to America and Europe to study the best agricultural systems; colleges and schools of agriculture and dairying are established, and professors are sent all over the country to induct the people into the best systems of scientific agriculture. Mr. Alexander Heener Ford gives an excellent sketch of Russian methods in the August *Century* of "America's Agricultural Regeneration of Russia." Amongst other interesting details, he says that great watercourses, which American dredges are constantly deepening, have made possible the following novel method of presenting object lessons to the tillers of the soil:—

The Russian educators, in casting about for the best means of economically fulfilling their mission, decided to experiment with immense floating gardens hundreds of feet in length. These great barges, built wide enough to give a comfortable area for the laying out of a garden, are launched with the breaking up of the ice. As these floating agricultural experiment stations drift slowly down stream to warmer climes, the seeds sprout, and grain grows and eventually ripens. On the deck of the great barge is an extensive building, the residence of the professors of agriculture who have the station in charge, and a smaller house for the crew. The size of these buildings, however, is dwarfed by the immensity of the barge. On its great, broad deck, besides the vegetable and grain beds, are various working models of beehives, for the Government is bending every energy to revive this industry, once famous in Russia, when honey-mead was the national drink.

As the barge journeys with the current, it stops at every village. The church bell is rung, and the people gather from the fields to be led by the "starosta," or mayor, to the floating farm. They are invited aboard, where the various plants are explained to them, while illustrated lectures are sometimes given on the advantages of diversified farming. The questions of the peasants are intelligently answered, and seed is often left with the most enterprising for planting. So far the barge experimental farms have proved the most efficient method of spreading the new knowledge of farming in Russia, for the country is one vast plain. The great rivers flowing southward through the rich agricultural prairies take their rise in the dense forests of Central and Northern Russia. Here the great barges are built late in the fall, the spring freshets are made to save the expense of launching, and when fall comes again the wood of the barges can be sold in the treeless southern country, where wood is dear, and thus made to pay the expenses of the trip down stream.

In America we little realise the extensive use Russia makes of her waterways. In European Russia alone there are over 60,000 miles of navigable waterways, or almost three times the mileage of navigable rivers in the United States.

American farming methods are spreading everywhere throughout the empire. It is estimated that Russia will spend this year from 8,000,000 to 10,000,000 dollars on American machinery.

SHEEP ON THE FARM.

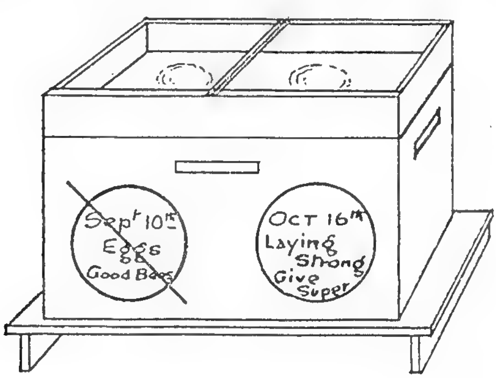
The time is fast approaching when farmers on the Darling Downs and in other districts will breed lambs for export in large numbers. The soil, the climate, the native and cultivated grasses, all point to the possibility of this industry largely developing. Some three years ago a lecturer at one of the Canadian farmers' institutes gave the following ten reasons why farmers should keep sheep:—

1. They are profitable.
2. They weaken the soil least and strengthen it most.
3. They are enemies of weeds.
4. The care they need is required when other farm operations are slack.
5. The amount of investment need not be large.
6. The returns are quick and many.
7. They are the quietest and easiest managed of all farm stock.
8. Other farm products are made more largely from cash grains, whilst those from the sheep are made principally from the pasture.
9. There is no other product of the farm that has fluctuated so slightly in value as mutton.
10. By comparison, wool costs nothing, for do not the horse and cow, in shedding their coats, waste what the sheep saves?

The New Zealand Loan and Mercantile Agency Company, we are glad to learn, has co-operated with the Drayton and Toowoomba Agricultural Society to offer a considerable prize to sheepbreeders who will exhibit lambs suitable for export at the society's next show in January. There will be two prizes. The first, the society's prize for the best pen of thirty lambs fitted for freezing; the second, a prize of £10, given by the New Zealand Loan and Mercantile Agency Company, which, by subscriptions in addition, will probably amount to £50 for the pen, which, when frozen and shipped to London, obtain the highest price in that market. The New Zealand Company undertakes to prepare the lambs for shipment on account of the owners, and to return to each the net proceeds of the whole shipment. Owners can make as many entries as they please.

This is a decidedly good step in the right direction. The results will doubtless be eagerly looked forward to by all farmers and graziers, and especially by owners of grazing farms. If successful, there can be little doubt that the breeding and export of frozen lambs will assume very large proportions.

BEE-KEEPING—HOW TO KEEP RECORDS OF HIVES.



The above diagram should have accompanied Mr. H. R. Stephens's article on bee-hives in the last issue of the *Journal*, but was inadvertently omitted.

Dairying.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 30TH SEPTEMBER, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Leesome ...	Ayrshire... ...	18 Sept., 1900	179	4·2	8·42	Dry, 25th Sept., 1901
Ruth ...	,, ...	8 Oct. ,,	62	4·0	2·77	Dry, 12th Sept., 1901
Laura ...	,, ...	28 Aug. ,,	500	3·6	20·16	With first calf
Renown ...	,, ...	29 Nov. ,,	382	3·5	14·97	With first calf
Ruby ...	,, ...	9 April, 1901	463	3·7	19·18	With first calf
Blink ...	,, ...	2 Feb. ,,	616	3·5	24·14	
Annie Laurie	,, ...	25 April ,,	785	3·6	31·65	
Bonny ...	,, ...	12 April ,,	492	3·6	19·83	
Linnet ...	,, ...	7 May ,,	795	3·7	31·37	
Lass	,, ...	24 Aug. ,,	724	3·6	29·19	With first calf
Isabelle ...	,, ...	7 Sept. ,,	612	3·6	24·77	
Lavina ...	,, ...	11 Sept. ,,	927	3·5	36·33	
Baroness ...	Jersey	3 Aug. ,,	164	4·4	8·08	
Playful ...	,, ...	14 July ,,	434	3·9	18·62	
Spec ...	,, ...	27 Aug. ,,	622	4·4	30·65	With first calf
Stumpy ...	,, ...	27 Aug., 1900	506	5·2	27·46	
Evileen ...	,, ...	2 Sept. ,,	617	5·1	35·24	
Connie ...	,, ...	8 Sept. ,,	416	4·5	20·96	
Effie ...	,, ...	6 Jan., 1901	281	5·0	15·73	
Content ...	,, ...	6 June ,,	484	4·4	23·85	
Olive ...	,, ...	4 July ,,	228	5·3	13·53	
Bell	,, ...	15 Sept. ,,	193	4·2	9·07	With first calf
Alice ...	Grade Shorthorn	13 Nov., 1900	481	4·0	21·54	
Clara ...	,, ,, ...	14 June, 1901	504	3·5	19·75	
Ginger ...	,, ,, ...	19 Dec., 1900	394	3·8	16·76	
Princess May	,, ,, ...	25 May, 1901	539	4·4	26·56	
Poly Red ...	,, ,, ...	21 Feb. ,,	487	3·6	19·52	
Peggie ...	,, ,, ...	29 May ,,	596	3·5	23·36	
Rosella ...	,, ,, ...	5 Sept., 1900	244	3·8	10·6	
Restless ...	,, ,, ...	3 Sept. ,,	30	4·2	1·41	Dry, 7th Sept., 1901
Redmond ...	,, ,, ...	22 Aug., 1901	676	3·7	28·01	
Laurel ...	,, ,, ...	22 Aug. ,,	724	3·5	28·38	
Lucy ...	,, ,, ...	9 Sept. ,,	470	3·8	20·00	
Horney ...	,, ,, ...	22 Sept. ,,	96	3·6	3·87	With first calf
Cherry ...	Shorthorn ...	11 April ,,	416	3·5	27·50	
Countess ...	,, ...	18 June ,,	773	3·6	31·16	
Dott ...	,, ...	31 May ,,	631	3·6	25·44	With first calf
Gladdy ...	,, ...	29 April ,,	472	3·5	18·50	
Kit ...	,, ...	28 Sept., 1900	105	3·9	4·58	Dry, 28th Sept., 1901
Maggie ...	,, ...	20 May, 1901	483	3·5	18·93	
Olga ...	,, ...	19 June ,,	475	3·3	17·55	With first calf
Plover ...	,, ...	3 July, 1900	452	4·1	20·75	
Queenie ...	,, ...	19 May, 1901	603	3·6	24·31	
Roany ...	,, ...	17 Mar. ,,	345	3·5	13·52	
Rose ...	,, ...	10 April ,,	438	3·6	17·66	With first calf
Violet ...	,, ...	9 Oct., 1900	490	3·6	19·75	
Guinea ...	,, ...	18 July, 1901	740	3·4	28·17	
Nestor ...	,, ...	3 July ,,	685	3·3	25·31	
May ...	,, ...	16 July ,,	776	3·6	31·28	
Lady Vixen...	,, ...	13 July ,,	601	3·5	23·55	With first calf
Dora ...	South Coast ...	2 June ,,	458	4·0	20·51	With first calf
Grace ...	,, ,, ...	15 June ,,	640	3·5	25·08	With first calf
Trixey ...	,, ,, ...	4 July ,,	608	3·6	24·51	With first calf
Ada ...	,, ,, ...	16 July ,,	700	3·7	29·00	With first calf
Lady Rose ...	Guernsey ...	15 April ,,	306	4·9	16·79	With first calf
Damsel ...	Holstein	19 Jan. ,,	661	3·2	23·69	With first calf
Pansy ...	Grade Jersey ...	4 Dec., 1900	63	4·5	3·17	Dry, 12th Sept., 1901
Carrie ...	Jersey	31 Aug., 1901	643	4·6	33·12	

The cows were grazed for a few hours daily on portions of the cultivated area.

THE DAIRY HERD.

THE PROPERTY OF THE SCOTTISH AUSTRALIAN INVESTMENT COMPANY, LIMITED, TALGAI WEST, *VIA* HENDON.

RETURNS FROM 1ST TO 30TH SEPTEMBER, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Lily	Holstein	14 May, 1901	934	4·2	43·75	Heifer in first calf
Jubilee	Jersey	19 Nov., 1900	345	4·9	19·10	
Victoria	,,	21 May, 1901	663	4·8	35·91	
Jean	,,	30 May ,,	608	4·2	28·48	
Kate	,,	17 Aug. ,,	604	5·2	35·95	
Duchess	Grade Jersey	19 Nov., 1900	507	4·3	24·36	
Scarlet	,,	15 May, 1901	632	3·7	25·84	Heifer in first calf.
Goldenspray	,,	25 June ,,	967	4·3	46·47	
Favourite	South Coast	6 May ,,	557	4·0	24·73	Heifer in first calf.
Noura	Shorthorn	26 Oct., 1900	423	3·8	17·82	Heifer in first calf.
Fortune	,,	15 Jan., 1901	94	4·4	4·63	Dried off, 14-9-1901.
Primrose	,,	6 Feb. ,,	603	4·1	27·48	
Vanity	,,	3 March ,,	448	3·7	18·32	Heifer in first calf.
Dora	,,	12 March ,,	408	4·5	20·60	
Countess	,,	15 May ,,	585	3·6	23·26	
Bess	,,	27 May ,,	726	4·0	32·23	
Julia	,,	15 June ,,	702	4·0	31·17	
Edith	,,	17 June ,,	783	3·6	31·13	Heifer in first calf.
Jeannie	,,	20 June ,,	518	3·6	20·60	Heifer in first calf.
Rusty	,,	17 Aug. ,,	781	4·1	35·60	
Jessamine	Grade Shorthorn	16 Nov., 1900	490	4·2	22·09	
Dolly	,, ,,	16 Jan., 1901	472	4·4	23·26	
Sunbeam	,, ,,	20 Jan. ,,	304	4·6	15·72	
Majestic	,, ,,	2 March ,,	603	3·7	24·66	
Jupiter	,, ,,	26 April ,,	515	4·1	23·47	
Nellie	,, ,,	29 April ,,	436	3·6	17·33	Heifer in first calf.
Lizzie	,, ,,	3 May ,,	387	4·1	17·64	Heifer in first calf.
Nessie	,, ,,	13 May ,,	560	3·6	22·26	Heifer in first calf.
Dairymaid	,, ,,	24 June ,,	669	4·0	29·70	
Bridget	,, ,,	17 July ,,	690	3·7	28·22	
Midget	,, ,,	24 Aug. ,,	797	3·6	31·69	
Milkmaid	,, ,,	31 Aug. ,,	705	4·3	33·88	
Trimmer	Grade Ayrshire	11 Dec., 1900	474	3·6	18·84	
Marjorie	,, ,,	10 Jan., 1901	509	4·0	22·60	
Mermaid	,, ,,	23 Jan. ,,	501	3·5	19·34	
Charity	,, ,,	23 Jan. ,,	402	4·4	19·81	Heifer in first calf.
Madam	,, ,,	13 March ,,	587	3·9	25·40	
Emma	,, ,,	21 March ,,	455	3·8	19·16	
Victory	,, ,,	6 July ,,	679	3·7	27·77	
Faith	,, ,,	15 July ,,	819	4·0	36·37	Heifer in first calf.
Promise	,, ,,	26 July ,,	663	3·8	27·93	
Madeira	,, ,,	12 Sept. ,,	445	3·7	18·20	Heifer in first calf.

AUBIN DOWLING, Manager.

PROTECTING COWS.

During the hot weather now approaching, it is quite as necessary to protect cows from the sun as to shelter them from the cold winds and rains of winter. Farmers should realise the fact that cows which stand or feed all day in a shelterless paddock will not fill the milk-pail so well as those which are protected from the sun. Elaborate cow-houses are not required. A few stout forked posts, with a sapling roof covered with old straw, will be appreciated by the animals, and the result of this little care will be manifested in good milk returns. Farmers should ask Mr. Mahon, Principal of the Agricultural College, how he protected his horses and cattle in summer at a trifling expense.

HOME-MADE CHEESE.

Very little cheese is made by farmers in this country. Those who do make it often produce an article which would be hard to beat, even by New Zealand cheese. At the last Rosewood Show there was one cheese deservedly awarded a first prize, which would bring a good price in the English market, being quite equal to New Zealand cheese. In America and Canada many farmers make a considerable quantity of the article, and in some of the Schools of Agriculture in the United States experiments have been made to ascertain what cheese is the best for manufacture on the farm. It appears that the Gouda cheese has been pronounced to be the most satisfactory. In March last (Vol. VIII., p. 176), we gave directions for the making of this cheese, which is one of the most favourite of the Dutch varieties, and very similar to the Edam. Both these are imported, and meet with a ready sale in Brisbane. The *American Agriculturist* has a description of the method of home-production of Gouda cheese, by S. E. Wilcox, as follows:—

While fresh from the cow the milk is aerated. When it has stood long enough to lose its animal heat warm to 90 degrees Fahr., using sufficient rennet to cause coagulation in from 7 to 10 minutes. Let stand from 15 to 20 minutes, then insert the front finger at an angle of 45 degrees until it touches the curd. If on withdrawal the curd breaks clean across, with few or no bits attached, it is ready to cut. Divide with a knife until the size is that of an average wheat kernel. Stir gently 5 minutes, then gradually increase the heat until 100 to 104 degrees is reached, constantly stirring as the temperature rises. Drain or dip off the whey, leaving the curd firm, but not too dry. Press by the double handful firmly into the hoop, until full, then put on cover and press lightly an hour. Remove from the press, and put around it a band of cloth long enough to lap a little, and of sufficient width to cover 2 or 3 inches on each end. Cover top and bottom with a round cap, return to hoop for 24 hours, with increased pressure.

The Gouda cheese is ordinarily 3 in. thick and 8 in. in circumference. A simple lever press can be constructed of a hardwood stick, 10 ft. long and 4 in. in diameter, one end fastened under a cleat against the wall. The cheese, band and end covers, should be dipped in very hot whey or water before the cloth is applied. To salt the cheese, make a saturated solution of brine and float the cheese in it from five to eight days, turning every day and sprinkling a little salt over the top. After removing from the brine, turn once a day the first month, or, if kept two months, twice a week, and once a week the third month. The curing-room should be cool; a little dampness will be beneficial than otherwise. During the midsummer months the making of this cheese requires less labour than butter-making. The process is simple, the product good.

PURE ANGORA GOATS.

Numerous inquiries continue to reach us as to the possibility of purchasing pure Angora goats. The following letter, addressed to Messrs. Dalgety and Co., and published in *Dalgety's Review*, will therefore prove of interest to intending breeders. The writer is Mr. E. C. Kempe, Warrina, Adelaide, South Australia:—"Having noticed in your *Review* of 1st July an interesting article on the Angora goat, I thought that some of the readers of your paper might like to hear that there are a considerable number of pure Angoras in Central Australia. I have named my flock 'The Central Australian Flock of Pure Angoras.' The country where these goats are running is to the north of Lake Eyre. The country and climate suit them well, although the average rainfall for the last ten years has been only 3½ inches. Undoubtedly in a barren land like this these creatures have come to stay, and will help the profitable settlement of so arid a region. The particulars of the flock are that in 1897 I bought, through Mr. C. Sabine, and from Mr. Price Maurice's Castumbul

Estate, one buck and two does, all pure bred; Mr. Sabine remarking in a note, 'The animals I picked myself, and they are very nice.' These goats were railed up—634 miles—an expensive journey. In 1898, at the sale of the late Mr. Price Maurice's Angora flock, from the 'Castumbul' Estate, I bought 144 head. Twenty of these were bucks, one especially selected. Two hundred and eighty-nine were sold on that day, that number, I believe, being the total of the flock. My goats have been kept pure, are carefully culled every year, with the object of retaining the fine quality of the mohair, and have always been shepherded. Last year my mohair, somewhat affected by drought, sold in London, 17th October, for 14d. per lb. for fleece, unclassed; locks for 7¼d. per lb. Merino fleece from this district, in most cases, last year did not reach 5d. per lb.; much of it very much lower. In 1889 mohair from this flock sold in London, October, at best fleece, 2s. per lb.; other, 1s. 6¼d.; locks, 6½d. 'Turkey Fair,' same sales, 20½d. for fleece. In 1898, from same flock, fleece and locks mixed, 1s. 5d. per lb. Same sales 'Turkey Fair' sold at 16½d. for fleece. I quote these figures to show that mohair from my flock has held its own at the world's sales. What is necessary for the growth of the finest mohair is a dry, sunshiny climate. This we certainly have here. The meat of the half-bred wether is preferred to ordinary mutton, if killed young. Last year I sold to a local butcher 100 wethers, half-bred, and the meat was not objected to by any of his customers. I may mention that my flock now numbers 600 head of pure and grade goats; none but pure and selected bucks are used. Pure bucks are for sale from this flock. I noticed in my last account sales, rendered on account of sale of goat-skins, that one skin, a half-bred wether's, brought 4s. 3d. I think this a good price, and shows that once known the animal (goat) will be a profitable one. I shear my goats every eight months. They kid once a year."

[It is a pity that Mr. Kempe has not mentioned the average weight of the fleece, as this is what inquirers particularly want to know. We believe that 2½ lb. of wool is the average, but a South African goat farmer sheared an average of 6 lb. per fleece, and 15 lb. from one fine male.—Ed. *Q.A.J.*]

ANGORA GOATS AT KILKIVAN.

The establishment of new industries in a State where men of means are not too numerous amongst the rural population is necessarily a matter of time. There appears to be a growing desire in the country districts to enter upon the breeding of Angora goats, if we may judge by the number of letters we receive asking for information concerning these animals. We have been handed the following letter by Mr. C. M. Jenkinson, M.L.A., from a gentleman at Kilkivan, in the Burnett district, which will show what one enterprising settler at least is doing in the goat-breeding way:—

More than thirty-five years ago my parents brought common goats with them from New South Wales. We crossed them with the Angora about four years ago, and now have some very good ones. If there were a law for the protection of the Angora, I would get a purebred buck and thus improve the fleece, making it of value for export, the lower grades not being of much value. Skins such as the one I gave you are worth 12s. 6d. each, and generally they range from 5s. to £1 each in price. [We have seen the skin referred to, and it was certainly a very beautiful one, the mohair being very long, silky, and plentiful—Ed. *Q.A.J.*] We have as yet not sold any of the mohair. Including kids, we have about 400 now. They are very easily kept and very healthy. Whilst the cattle were dying with ticks and red water, the goats were feeding all round them, and were not in the least affected, nor did we ever find a tick on them. The flesh of the Angora is superior to mutton, being finer in the grain, and that of the kids is a great delicacy.

JERSEY CATTLE.

Mr. Alfred Gorrie, owner of Carina Jersey Farm, writes:—I enclose a cutting from the *Queenslander* having reference to a numbers of Jerseys imported by me last month. This importation was rendered necessary by the demands on our herd for both bulls and heifers. The sales this month have been: Dag Fox, yearling bull, by Milklad 4th out of Flora (17 Q.D.H.B.), to Mr. H. Chambers, Yeronga; Primrose, 3½-year heifer, to Mr. H. A. Barber, North Eton, Mackay; Blaaven Duke, yearling bull, to Mr. William Wyatte, Rosewood; also yearling bull to Mr. Geo. Chislett, Lowood; and two bulls and one heifer to Mr. T. A. Atherton, Clifton Ville, Mackay; Perle D'or heifer in calf has been sold to Mr. J. G. Fearnley, Cairns. Inquiry has also been made from Mackay by Mr. C. W. Toussaint with respect to bulls and heifers in calf.

"Mr. A. Gorrie has recently made valuable additions to the Carina Jersey stud. Seven bulls and thirteen cows were purchased at the last Melbourne show, and brought to the Carina Farm, at Tambourine Mountain. Among the bulls was Pride of Barholm, a fine bull, bred by Mr. McCulloch, of Barholm, from the imported cow Little Katie 2nd, bred by Mr. H. A. Rigg, of Wykham Lodge, Surrey. She was h.c. in the heifer-in-milk class at the London Dairy Show just prior to leaving England. Her dam, Little Katie, won third milking prize at the same show in 1883. Pride of Barholm was first prize as a yearling and reserve champion of the Royal Show, Melbourne, in 1897. Since then he has been exhibited twelve times at different shows in Victoria, winning eleven firsts and one second, besides several dairy bull championships. Among the cows was a heifer from Mr. G. T. Chirnside's herd at Werribee Park, and by this year's champion bull, Golden Lad II.; also Lady Progress, a cow of rare quality, by Progress 3rd (imported) out of Lady Grey, who was by Neat Boy (imported). Lady Progress combines good symmetry of form with a splendidly developed udder. She has been a frequent prize-winner, having won first at many shows in Victoria, including the Royal. This year she was third prize in the cow-in-milk class at Melbourne, being beaten by Mr. Chirnside's two imported cows, Lotus Lily and Brighton Queen. Lady Grey, dam of Lady Progress, was also a very fine cow, and won first prize at the Royal Show, Melbourne, in 1892 and 1893. The remainder of the females are bred similar to Lady Progress."

PROFESSOR JAMES LONG ON DAIRY FARMERS.

Professor Long, of England, must have had the Queensland dairy farmer of twenty years ago in his mind when he wrote that which every good dairyman in the State will acknowledge to be most true. He remarked—

The dairy farmer who understands the principles of breeding and strives to carry them out is continually improving his cattle. He achieves something for himself and for his country. Inferior calves he never rears; inferior cattle he never buys. His drafts are his culls. His every cross is made in the hope of achieving greater excellence. He has set up a high standard, and that he is always striving to reach, but often fails, because with each success he fixes it higher. The careless breeder has no standard. He appears to recognise as a cow anything with an udder and four teats, and every bull will serve his purpose if he is fertile.

The above description fits Queensland as well as England. How few there are of the first class, and how many of the latter. The great Teacher said: "The poor you have with you always."

A well-known Brisbane breeder of dairy stock said, in speaking of the various breeds of cattle and of their milk-yielding capabilities: "Some breeds—notably the so-called 'general purpose cow'—will, after calving, start off with a heavy flow of milk, but only keep it up till the calf is ready to nibble grass, and then falls off rapidly till she is not earning her keep. Others keep up a regular supply, and will give a good flow right up to the time of calving, if allowed to do so. Which is the better plan? To keep cows which are dry for six months of the year, or to use judgment in building up a herd of cows which can be depended upon to keep in profit almost the whole time?

FEEDING AND MILKING TESTS—PROFIT ON COWS.

At the Pan-American Exposition there is a model dairy, and some highly interesting experiments are now going on with various breeds of dairy cattle. On 27th August of this year a report for the week is given in *Hoard's Dairyman.* At the time this report was issued, the cows had been seventeen weeks at the model dairy, and are to remain there to the end of the milking season.

By comparison of the profit on each breed, it will be noticed that the Jerseys, Guernseys, and Ayrshires stand at the head of the list, Guernseys yielding a profit during the seventeen weeks (less one day) of 163·98 dollars; Jerseys, 157·07 dollars; and Ayrshires, 154·46 dollars: or Guernseys, £32 16s. 7d., equal to £6 11s. 3d. per cow; Jerseys, £31 8s. 7d., or £6 5s. 8½d. per cow; and Ayrshires, £30 18s. 7d., being £6 3s. 8½d. per cow. This is the clear profit after paying expenses. The following is the table as given in the report:—

Report on Model Dairy for the Week ending 27th August, 1901.

Name of Cow.	Milk.	Percentage of Fat.	Amount of Butter.	Value at 25 Cents per lb.	Cost of Feed. Total.	Profit.
SHORTHORN.						
14th Princess of Thule ...	169·30	4·10	8·16	2·04	1·16	·88
Daisy D	216·10	3·45	8·77	2·19	1·19	1·00
Miss Molly	228·80	3·80	10·22	2·55	1·19	1·36
Queen Bess	202·60	3·75	8·93	2·23	1·15	1·08
Rose Third	186·70	3·70	8·12	2·03	1·16	·87
Total	1003·50		44·20	11·04	5·85	5·19
HOLSTEIN.						
Meg	227·90	3·40	9·11	2·28	1·32	·96
Tidy Abberkirk	245·20	3·30	9·51	2·38	1·25	1·13
Inka Mercedes	267·00	3·00	9·42	2·35	1·24	1·11
Hulda Wayne Aggie	259·90	3·30	10·09	2·52	1·25	1·27
Beauty of Norval	272·50	3·60	11·50	2·87	1·25	1·62
Total	1272·50		49·63	12·40	6·31	6·09
AYRSHIRES.						
Kirsty Wallace	213·70	3·70	9.31	2·33	·93	1·40
Lady Flora	196·80	3·40	7·87	1·97	·93	1·04
Alice 2nd	171·70	4·10	8·28	2·07	·93	1·14
Betsy	217·60	3·80	9·72	2·43	·93	1·50
Pearl	204·60	3·80	9·14	2·28	·93	1·35
Total	1004·40		44·32	11·08	4·65	6·43
JERSEYS.						
Gipsy	182·60	4·35	9·34	2·33	·98	1·35
Primrose Park's Prude ...	153·00	5·90	10·62	2·65	·88	1·77
Queen May	176·70	4·80	9·97	2·49	·85	1·64
Rexina	190·60	4·20	9·41	2·35	·80	1·55
Mossy	177·70	4·50	9·40	2·35	·85	1·50
Total	880·60		48·74	12·17	4·36	7·81
FRENCH CANADIAN.						
Liena Flora	166·60	4·20	8·23	2·06	·78	1·28
Rowen	163·90	4·70	9·06	2·26	·79	1·47
Denise Championne	178·10	4·20	8·80	2·20	·79	1·42
Luna	154·70	4·00	7·28	1·82	·74	1·08
La Bouchette	128·90	3·70	5·61	1·40	·46	·94
Total	792·20		38·98	9·74	3·55	6·19

REPORT ON MODEL DAIRY FOR THE WEEK ENDING 27TH AUGUST, 1901—*continued.*

Name of Cow.	Milk.	Percentage of Fat.	Amount of Butter.	Value at 25 Cents per lb.	Cost of Feed.	
					Total.	Profit.
GUERNSEYS.						
Vegia	169·70	4·75	9·48	2·37	·85	1·52
Cassiopea	202·50	4·40	10·48	2·62	·91	1·71
Mary Marshall...	185·10	5·60	12·19	3·05	·92	2·13
Medora Fern	135·00	4·75	7·54	1·88	·84	1·04
Procris of Paxtang	179·30	4·70	9·91	2·48	·90	1·58
Total	871·60		49·60	12·40	4·42	7·08
DUTCH BELTED.						
Alberta	111·60	3·20	4·20	1·05	·72	·33
Madeline	218·70	3·20	8·23	2·06	1·01	1·05
Belle of Warwick	203·20	4·20	10·04	2·51	1·03	1·48
Merletta...	129·70	3·20	4·88	1·22	·94	·28
Holland Creamery	175·50	3·50	7·22	1·80	·93	·87
Total	838·70		34·57	8·64	4·63	4·01
POLLED JERSEYS.						
Phyllis	154·40	4·45	8·08	2·02	·91	1·11
Pride's Favorite	123·30	4·70	6·81	1·70	·71	·99
Queen	125·10	6·40	9·41	2·35	·84	1·51
Justina	79·50	4·10	3·83	·96	·48	·48
Ora	193·70	4·55	10·36	2·59	·87	1·72
Total	676·00		38·59	9·62	3·81	5·81
RED POLLS.						
Tryste	186·10	3·70	8·10	2·02	·91	1·11
Easter	192·20	3·75	8·47	2·12	·94	1·18
May Flower	218·20	4·40	11·29	2·82	1·00	1·82
Susie	217·40	4·00	10·23	2·56	·99	1·57
Flora	131·70	4·90	7·59	1·90	·85	1·05
Total	945·60		45·68	11·42	4·69	6·73
BROWN SWISS.						
Lucy	210·10	3·30	8·15	2·04	·95	1·09
Nicola	187·30	3·30	7·27	1·82	·95	·87
Eliza	192·70	3·85	8·72	2·18	·98	1·20
Belle T.	205·10	4·20	10·13	2·53	·92	1·61
Hope of Minnesota	213·60	3·65	9·17	2·29	·91	1·38
Total	1,008·80		43·44	10·86	4·71	6·15

GIVING TOTALS OF EACH HERD FROM TEST 1ST MAY, UP TO AND INCLUDING THE WEEK ENDING 27TH AUGUST, 1901.

Name of Herd.	Lb. Milk.	Amount of Butter.	Value at 25 cents per lb.	Value Hay Fed.	Value Silage Fed.	Value Grain Fed.	Total Cost of Feed.	Profit.
Holsteins	26,765·3	990·71	247·67	21·98	16·16	66·27	104·50	143·17
Ayrshires	23,223·1	984·38	246·09	21·27	13·75	56·61	91·63	154·46
Short Horns ...	22,478·8	903·63	225·90	22·30	16·05	66·96	105·81	120·09
Brown Swiss ...	22,127·6	917·64	229·40	27·77	12·50	58·89	99·16	130·24
Red Polls	20,679·0	939·60	234·90	20·55	13·40	58·45	92·40	132·30
Guernseys	19,565·9	1,019·25	254·80	23·88	14·20	55·74	90·82	163·98
Jerseys	18,945·7	983·14	245·77	18·58	13·27	56·85	88·70	157·07
French Canadian ...	17,686·3	792·35	199·09	16·90	13·82	46·18	76·90	121·10
Dutch Belted ...	17,063·1	664·29	166·06	19·75	10·81	54·59	86·13	79·93
Polled Jerseys ...	14,468·8	772·12	193·02	22·28	9·72	39·99	71·99	121·09

Poultry.

PRESERVING EGGS.

Notwithstanding the frequency of our instructions as to the preservation of eggs, we constantly receive letters asking for information on the subject. We have at this moment several dozens of eggs we placed four months ago in a mixture of lime-water and table-salt in the proportions of 1 lb. of quicklime to ½ lb. of table-salt per gallon of water. The eggs are perfectly fresh. The table-salt is not absolutely necessary. For preservation in waterglass, sodium silicate is quite effective if a weak solution is made of one part of waterglass in a semi-fluid condition to twenty parts of water.

The pickle is made as follows:—Boil 20 pints of water, and when cool pour in 1 pint of waterglass, stirring well. Place the eggs in the receptacle in which they are to be kept, and pour the solution over them, covering them completely. Waterglass can be obtained at 3d. per lb. in large quantities in Brisbane from Messrs. Elliott Bros., so that the pickle should be both cheap and easy to prepare. It is of course essential that nothing but absolutely fresh eggs are pickled, and that before boiling them the shells should be punctured with a needle to prevent bursting. No cracked egg should be placed in the solution.

GEESE, TURKEYS, AND DUCKS FOR EXPORT.

Geese.

Why do so few farmers keep geese? Whilst fowls, and often ducks and turkeys, may be seen on the farms of Queensland, everywhere there is a dearth of geese. Geese are not particularly troublesome to rear, not nearly so troublesome as turkeys. Once the goslings have learned to eat and drink without assistance from the owner there is no more difficulty with them. Geese require grass, which constitutes a great part of their food, and this is perhaps one reason why farmers do not keep them in quantities. They taint the paddock in which they run to such an extent that cattle and sheep will not graze after them. But this trouble could easily be obviated by subdividing the paddock with a rolling fence. Breeding geese for export should prove a profitable business, especially if they are shipped to reach England at Michaelmas. They should be bred from the largest birds obtainable from an Emden or Toulouse gander in his second season to ensure fertile eggs. The laying geese should be shut up at night and the eggs collected in the morning. Make the nests on the ground and use hens for hatching. A good hen will cover four goose eggs. Feed them well from the time of hatching, and by the time they are five months old they should weigh about 10 lb. Let the goslings have good grass runs for the first ten weeks and then shut them up in small fattening yards to prepare them for export.

Turkeys.

Like geese, turkeys require plenty of grass land. They thrive well on land open to standing scrub, where they find an abundance of animal food in the shape of snails, grubs, &c. As they are great wanderers, it is advisable to accustom them to coming up for a feed once a day. For export purposes the bronzewing is the best. It matures quickly, and carries more breast flesh than any other.

Unlike fowls and ducks, turkeys can be made to sit at any time. Place the nests on the ground, and give the sitting hen a baker's dozen of eggs—thirteen—to hatch out. When hatched care must be taken about feeding the young birds. Hard-boiled eggs, onions, boiled rice, &c., should be chopped up fine

for them, and bread, oatmeal, and pollard, scalded with milk or water, may also be given. Turkeys require a certain amount of animal food, such as boiled liver, and chopped-up meat. Cabbage and lettuce should also be given. Many people keep their turkey chickens too much confined. This is a mistake. They should be allowed all possible freedom, being housed during inclement weather. Size and weight count for everything in the turkey on the English market. A fair turkey-gobbler, under twelve months, should weigh about 12 lb., and hens 7 lb. These weights can, however, be much increased by judicious feeding.

Ducks.

In the last issue of the *Journal* we gave a description of the Messrs. Baynes's duck farm at Belmont. The ducks are being bred for export, and are fed and treated with that object in view. Ducks mature very rapidly. Ten weeks are sufficient to produce birds fattened for the market. Aylesburys and Pekins are the best, and good crosses are:—Aylesbury drake with Pekin ducks, and *vice versâ;* Rouen drake with Aylesbury or Pekins, or Pekin and Aylesbury drakes with Rouen ducks. Drakes should be over nine months old to ensure fertile eggs, and six or seven ducks should be assigned to each drake. Ducks intended for market should not be allowed near water. For duck-rearing on a large scale incubators are almost a necessity. If no incubator is used, hen turkeys or common hens should be taken for sitters. Straw should be freely supplied to the pens in which the ducklings are placed to supply warmth. Beyond this they require nothing but frequent feeding. Feed eight times a day. As the ducklings grow the feeding times may be reduced to six. Give very little moisture in the food, which should consist of chopped liver, wheat, barley, pumpkins, and lucerne boiled. For dry food, pollard and oat-dust. Supply plenty of oyster-shell grit. Water-troughs should be placed in the pens and yards, covered with wire-netting to prevent the birds getting into the troughs and fouling the water.

THE FOOD VALUE OF VEGETABLES.

Tomatoes rouse torpid liver and do the work, ordinarily, of a doctor's prescription.

Lettuce has a soothing, quieting effect upon the nerves, and is an insomnia remedy.

Celery is an acknowledged nerve tonic, and is more and more used in medicinal prescriptions.

Onions are also a tonic for the nerves, but people will be forever prejudiced because of their odour.

Potatoes should be eschewed by those who " have a horror of getting fat," as that is one penalty of eating them.

Parsnips, it is now contended by scientists, possess almost the same virtues that are claimed for sarsaparilla.

Beets are fattening, and even a moderately-learned man will understand that it is because of the sugar they contain.

Ordinary Lima beans, some one has said, are good to allay thirst, but the same can be said, with equal truth, of a pitcher of water.

Asparagus is efficacious in kidney ailments to an extent that is not yet, perhaps, thoroughly appreciated.

Cucumbers, aside from sunbeam emitting properties known to readers of facetious paragraphs, contains an acid that is helpful in some cases of dyspepsia.

Parsley will assist good digestion, like cheese and nuts, but a quantity in excess of ordinary capacity has to be consumed. Therein lies the joke.

Pumpkins are an ingredient in a patent medicine that is guaranteed to cure quite a variety of ailments flesh is heir to, but the world is increasing in inhabitants who do not believe all they hear.—E. H. Noyes, in " What to Eat."

The Orchard.

The Director of the Botanical Gardens, Mr. Philip Mac Mahon, writes:—Dr. Bonavia has asked me to hand the enclosed paper on "Imperial Gardens for Fruit Dissemination throughout the Empire" to the editor of some leading journal in Brisbane. Dr. Bonavia is the author of the fine work "The Oranges and Lemons of India and Ceylon," and an authority on the subject whereof he writes. May I trouble you to have a copy of your issue in which the paper appears forwarded to Dr. Bonavia, Westwood, Richmond road, Worthing, Sussex, England.

The following is the paper accompanying Mr. Mac Mahon's letter:—

IMPERIAL GARDENS FOR FRUIT-TREE DISSEMINATION THROUGHOUT THE EMPIRE.

By Dr. Bonavia, F.H.R.S.

It is gratifying to learn that the two notable bananas of India—or plantains, as the English there call them—have been at last introduced into the Royal Gardens at Kew.

The "Ram Kela" and the "Champa" bananas must have been known to the British in India for perhaps a hundred years, and yet nobody, until recently, has ever thought of introducing these fine things either into England or to any of our colonies.

I do not think there are many plants the stools of which—like bulbs—can be taken long distances without any special care. The banana is such a plant.

The way it is grown in Northern India is this:—

A trench is dug, 3 feet deep and as many broad. The bottom of the trench is manured, and the bulbous roots, with their sprouts, planted there—4 or 5 feet from each other. Then every year a lot of fresh cowdung is thrown round the stems, until the trench is filled up in the course of years, when the site is changed and the same process repeated. The banana requires plenty of water, except in rainy seasons.

In Northern India the choicest varieties cannot be cultivated, as both the hot winds and the cold winter nights are unfavourable to them. Bombay, Madras, and Bengal are the districts that suit them.

The comparatively inferior variety now so largely grown in the West Indies cannot be compared with the choicer ones of India.

It is surprising that wealthy persons in the United Kingdom have never devoted a special glass-house to the cultivation of these indubitably fine varieties of plantain.

The introduction of these choice bananas into England is a movement in the right direction. Eventually they can be disseminated throughout the tropical dependencies of Great Britain.

But this is not enough.

There is room for two or three Imperial gardens, where some of the choicest fruit trees of the world could be collected, studied, and not only disseminated throughout the empire, but new ones evolved by seed variation and cross-fertilisation; for it is idle to suppose that all these choice fruits were originally contained in the Garden of Eden.

Let us take them seriatim:—

(a) One or Two Gardens for the Citrus Genus.

There are so many fine and distinct varieties of this wonderful genus—some of which are very little known out of the localities in which they are grown—

that it would be an advantage to the people of the empire, and also to mankind in general, to have them collected for the study of their botanical and horticultural characteristics and commercial values.

THE PORTUGAL ORANGE GROUP.

The Portugal orange, of which the British markets are now full, with its variations, the seedless oval orange of Malta, and the oval orange of Jaffa, also seedless, and the blood orange, &c., are sufficiently well known to need no description.

I am informed that in Malta there exists a unique orange of the same group, but which is never sour from beginning to end, but sweet and juicy. It is called there "Loòmi-Larènj." I have never met with an orange of this description in India. It would be worth while getting hold of it for the purpose of multiplying it and bringing it into commerce. Such a unique orange, I believe, has never appeared in the English market.

In India I met with two varieties of this group; both are fine and worthy of being more generally known. The one is the "Bàndir" of Tanjore, a large orange, 12 inches in girth or so, with a yellowish-orange skin when ripe. The other is the "Mussèmbi" of Poona. Its name is evidently a corruption of Mozambique, and it goes to the Bombay market. The exterior is orange-yellow, and is covered with longitudinal furrows from base to tip. Natives say this can be kept on the tree for a whole year without deteriorating.

THE SUNTARA GROUP OF INDIA.

The loose-skinned "Sùntără" orange of India, as far as I know, has only appeared once in the London shops. There is a considerable trade in this orange in India itself.

There are two widely spread varieties of it. The one is called "Nagpore" orange, some of which find their way to Bombay. It is this, I believe, which, on one occasion, was sent to London.

The other is the "Sylhet" orange, which mainly goes to Calcutta, and is grown *solely* from seed.

The fruit of the two differs little, but the tree of the former has a spreading form; while that of the latter is upright, somewhat in the fashion of a Lombardy poplar, although, of course, not so tall by any means.

There are other good varieties of this group which are little known. One is grown in Lahore, the fruit of which is distinctly pyriform (see "Oranges and Lemons of India and Ceylon," Plate CIX.) It is wrongly called "Kàrna" in Lahore. Another is the "Jàwa-nàrun" of Ceylon, resembling a purse with a much-puckered surface.

A still more interesting variety is the green orange of Ceylon, called there "Kònda-nàrun." It is invariably eaten in its green state. Rumpius mentions an orange which is green when quite mature, and, if left on the tree till it colours, becomes, he says, worthless. But, in an experiment which I made with these green oranges in 1884, I found them better flavoured and more juicy as they turned yellow.

Both the "Jàwa-nàrun" and the green "Kònda-nàrun" are pictured in Miss North's Gallery at Kew, No. 266.

In Ceylon, a number of the varieties of the "Sùntără" group are called mandarins, but the only true mandarins I ever saw there were a few on a neglected tree which the late Dr. Trimen showed me in Peradeniya.

The tangerines of the London shops are no other than mandarins.* I never could discover one in London worth eating. To enjoy it you must grow it yourself, and take it off the tree when fully ripe. The perfume of its peel is not to be found in any other orange.

To the "Sùntără" group belongs a small orange, grown almost wild on the borders of Nepaul, north of Goruckpore. It is the sweetest orange I ever

* Perhaps they may be a seed variety, and a little smaller than the true mandarin.

came across, perhaps a little too sweet. It is locally known by the name of "Sùntŏlăh."

Another important Indian orange belongs to what I consider a sub-group of the Sùntără. It goes by the name of "Kèonla" or "Kàmala." Its exterior is of a deep lobster-red, and even when quite coloured is sourish, but if left for a long time on the tree it sweetens. It is the latest of all Indian oranges.

The "Làroo" of Poona is, I consider, a variety of the foregoing. It is flat and very loose-skinned, so much so that the pulp-ball can be made to rattle within the skin.

I have enumerated all the Indian oranges that could, I think, be made marketable, although there are several others.

It is not easy to find a place for an Imperial orange garden, where all the orange varieties of the Citrus genus could be studied, for one kind of soil might not suit them all. The Mediterranean climate would probably suit all varieties, and Cyprus or Egypt might perhaps be mentioned as an eligible locality. It must be a place where water could be easily procured, and not subject to frost.

(*b*) A Mango Garden.

An Imperial garden for mango-trees of the choicest varieties, for the study, propagation, and dissemination of this noble fruit. There are at least about fifty choice varieties of this unique fruit, some of which cannot be bought, but are grown in the orchards of native gentlemen, and kept for presentation to important officials and select friends.

The mango is the one fruit in which the native of India takes a real interest. You may mention to him many other fruits, but he will tell you, "They don't come up to the mango."

No one who has not lived some time in India, and has discovered what a choice mango just ripe means, can form any adequate idea of the exquisite flavour of this fruit.

New arrivals in India, having heard of the mango, very often get hold of seedling bazaar mangoes, and pronounce them a fine combination of tow and turpentine. They have a sort of turpentine flavour, and the inferior varieties are very stringy, and can only be sucked. Nevertheless, there are often exquisite flavours even among these.

The mango is never allowed to ripen on the tree, but is plucked at a certain stage and packed in large jars among straw. This operation is called putting the fruit in *pàl*. The reason given for this is that the mango ripens more evenly and through than on the tree. In England pears are treated in much the same way. When taken off the tree they are not fit to eat, and many kinds of pears require to be kept a long time before they are fit to eat.

This characteristic of the mango fruit would prove advantageous for exportation, as it would ripen on the voyage.

All the choice varieties most probably originated by seed variation, and their good qualities are kept up by proper cultivation.

All the fine varieties are propagated by grafting them on seedlings of the ordinary ones.

The mango-tree cannot be grown successfully in localities subject to severe frost. On one occasion, in Lucknow, in the first week of January, 5 degrees of frost were registered. All the poinsettias in the horticultural garden were, of course, killed outright; the young seedling mango plants in the nursery prepared for grafting were killed; and up to 6 feet from the ground all the leaves of the large mango-trees were blackened, but above that line no leaves were touched.

In the hot dry weather the trees want regular watering.

Some place in India not subject to frost, and where water can be easily got at, and with good soil, would be suitable for a garden such as is here suggested.

There are so many exquisite varieties of mango that they could not readily be studied, and their characteristics found out, without being collected in one garden. From thence they could be disseminated to all parts of the empire where the climate would be likely to suit them.

I have often tried those that sometimes appear in the London shops from the West Indies and other Atlantic islands. I never found one worth eating. They would not be looked at by an Indian mango connoisseur.

I have often wondered why wealthy English gentlemen, with extensive gardens and acres of glass-houses, have never, that I am aware of, undertaken to build a special house for the reception and growth of the trees that produce one of the finest fruits in the world.

It is the same with oranges. The British markets are flooded with foreign oranges, which are often unripe and sour. When ripe they are mostly stale, and not infrequently have a flavour of onions or tar. The flavour of tar is acquired from the ship-hold, and that of onions comes from a mixed cargo of oranges and onions!

To eat an orange off the tree when perfectly ripe would be a revelation to persons who have not been in orange countries, and the difference between those imported and those taken off the tree at the right time is something like the difference between night and day.

And yet one never hears of any wealthy gentleman undertaking to erect a special house for oranges, and to collect these fine things which are to be found in various parts of the world.

There is such a thing as a movable glass house on rails. Such contrivances would be very useful in England, where foreign fruit trees might be kept warm under glass in winter, and the house wheeled off them in summer to expose them to direct sunlight and rain, both being very invigorating to all trees.

If the present movable house is somewhat cumbersome it could be made in sections; and surely the engineers who have built the bridge over the Forth, and have done other wonderful things, would be equal to inventing a house that could be easily drawn away by either horse, steam, or hydraulic power.*

Then I am told that the reason why orange-trees are not popular in England is that their leaves have to be washed, which is a great bother. I am afraid, however, that sufficient experiments have not been tried, with washes syringed over the leaves, to rid them of that curious sooty, powdery parasite that more or less covers them. There is the ammoniated sulphate of copper, used successfully by the French to combat mildew on vines; there is carbolic soap, and petroleum, and other combinations that might be tried.

I must not forget, however, that I am writing about Imperial gardens for the dissemination of fruit trees which are little known, and not about private gardens.

Where mango-trees in India can be grown, guavas, lichis, and bananas can be also grown.

Of guavas there are two forms, the globular and pyriform. Those sold in bazaars are not choice, but they make one of the finest fruit jellies in existence. You have to eat guava jelly, freshly made, with clotted cream, on toast, to understand what this fine thing means.

All guavas make a capital stew—peeled, with the seeds scooped out, and stewed in sugar and a little water. They are excellent, with a *sui generis* flavour.

The raw fruits are not much relished by the English in India, owing to their strong scent; some cannot tolerate them in a room. But there are guavas and guavas. The choice varieties would be worthy of cultivation in an Imperial garden. There is one fine variety which I came across in Lucknow. It was presented to me by a native gentleman, and, strange to say, it had the

* At Baden Baden, in Germany, numbers of fine orange-trees were grown in immense boxes on wheels. These were kept in the glass house during the winter, and in summer were wheeled out to adorn the gardens of the Kur-saal.—Ed. *Q.A.J.*

flavour of strawberries! It is curious that this flavour should be imitated by two such distinct fruits as the grape and the guava.

Of the persimmon I know nothing, except what I read of it. Of the mangosteen I know nothing from personal experience. Everyone who has eaten it declares it to be a delicious fruit. I was informed that it had been introduced into the lower ranges of the Nilgiri Hills. Why they have not introduced it into Ceylon and cultivated it for commercial purposes is a mystery.

I think I have enumerated all the choice fruit trees of which I have experience, and which might be grown in Imperial gardens for dissemination throughout suitable places in the empire. In such gardens these trees could be studied, and the best mode of cultivating them and propagating them discovered. Moreover, it is only in such institutions that new varieties could be evolved from seed, for no private garden could possibly undertake the creation of new varieties of the fruits herein mentioned on the scale that would be required for success.

It might be said, especially with regard to oranges—why undertake such a troublesome and expensive job, when shiploads of oranges are already imported from various places? Well, no one will say that apples are not grown in this country in large quantities—the bewildering number of varieties at the shows testifies to this—yet shiploads of apples come from Canada and the United States.

What is being done in America with regard to fruit trees should be a lesson to the rulers of the British Empire.

I have left out of consideration a large number of varieties of the Citrus tribe which are to be found in India, such as lemons, limes, and citrons, &c. The latter might be utilised in India and elsewhere for making candied citron-peel. On one occasion I gave some citrons to a lady friend, and explained to her how this preserve was made. She turned out a candied peel which was much finer than any I could obtain in the shops, and the late Mr. Philip Crowley, of Waddon, always had most excellent home-made citron-peel.

The number of varieties of citron to be found in India is astonishing, as a glance at the "Oranges and Lemons of India and Ceylon" will show.

There is one fruit which must not be omitted in this sketch. It is the red-fleshed pummelo of Bombay. When cut across, its pulp is of the colour of raw beef, and it is the thinnest-skinned pummelo that I ever came across. It is fine-flavoured and juicy, and when the large juice vesicles are taken out and mixed with sugar they are delicious. This pummelo is of the size of a child's head, and sometimes of the size of a child's head affected with hydrocephalus!

I have done with these fine fruits, but there is one plant which should be grown largely in India itself—I mean the date palm. In Imperial gardens experiments might be systematically undertaken with the innumerable varieties of the date palm which are known in Asia and Africa; about 150 at least, although not all of first-class quality. The success obtained with these trees by the superintendent of the Saharunpore Garden proves undoubtedly that the notion that the date-tree cannot be grown successfully in India for its fruit is an antiquated superstition. India is written with five letters, but it is as large as Europe without Russia! The date-tree experiments, if undertaken, should be under the care of a practical dategrower imported from the Persian Gulf.

It is not intended in this sketch that Imperial gardens should have anything to do with growing flower plants and vegetables. That is already done in provincial horticultural gardens. The object should be to collect in one place, and under one supervision, as many of the choice fruit trees that can be grown in that locality, for the purpose of studying them, describing them, classifying them, and discovering the best mode of cultivating them, with the object of disseminating them throughout the empire in suitable localities for the health and enjoyment of the people and for commercial purposes.

Horticulture.

COTTAGE GARDENING.

By W. SOUTTER.

He who would lay out for himself a rural paradise here below cannot do so more successfully than by planting trees. By so doing he is not only giving pleasure and satisfaction to himself, but he is contributing to the adornment of the district in which he resides. There are few individuals who look upon tree-planting on broad principles, but plant chiefly to shut out their neighbours, and as long as a man can get an impenetrable hedge established close against the fence adjoining his neighbour, he is quite satisfied, and the trees are left to fight out the balance of their existence as best they can.

There is another class who set apart a small plot of ground near the dwelling, and lay it out with a dash of so-called architectural skill, mostly of a varied and severe type, the beds diversified in form and size, as a collection of animals in a zoo. Into these beds are jammed as many plants as the superficial area will accommodate; no allowance being made for future development. Can anything be more out of tune with nature? And yet we sit on our verandas and view our handiwork with a smug self-satisfied feeling. No one will venture to dispute that a few patches of colour near the front steps of the home are cheery and nice to look at; but cast the eye on the rear of the building, and this is usually the picture that presents itself to the gaze: A washing boiler standing lonely on three bricks, half submerged in a healthy patch of *Sida retusa*. A few kerosene tins in various stages of decay, numerous variegated jam tins intermixed with unchopable blocks of timber that have escaped from the wood heap. A few tired-looking clothes props considerably out of the perpendicular. A consumptive-looking peach-tree that does duty as a hen roost or supports a clothes line, and last, but not least, the unromantic but necessary outbuildings. This picture which I have depicted is not confined to Brisbane; it is a common picture visible in almost every part of the State.

How to alter the picture is the next question. The first thing asked by those who are determined to make a garden is, "What will it cost?" That is an important question. To make a garden properly, you must take an active hand in it yourself, and it will cost you a few patches of skin off your fingers consequent upon pulling *Sida retusa*, a backache consequent upon digging the ground to receive the plants, half-an-hour's less sleep in the morning, and, during a dry spell, a few trips with the watering pot in the evenings.

Now about planting. Never mind about your neighbour seeing into your garden; therefore don't plant a whole crowd of trees down your boundary line to shut him out. You ought to be downright pleased to let him see how pretty your garden looks, and he might be stimulated to make his own as beautiful. Just plant a few nice shade trees at respectable distances (about 30 feet apart); you do not want to have a scrub round the house. What you should aim at is effect and utility, without over-crowding. If a place is planted on these lines, you will have a thing of beauty and a joy for life.

Don't run away with the notion that you should not have any flowers. Far be it from me to advise that. Have flowers by all means, but don't build up a whole host of small beds like hearts, diamonds, spades, and clubs. Just make two or three good-sized beds and fill them sparingly with plants, always remembering that you can't grow flowers and trees in the same bed, neither han flowers and weeds be grown successfully together. Plants, as well as cuman beings, like plenty of elbow-room, so don't over-crowd.

The kind of trees to plant? In a State like Queensland, with such diversity of climate, the same classes of trees suitable for the coast are useless for planting in the interior, and, as charity begins at home, we shall begin with the coast, leaving the interior and north to a future time. For the neighbourhood of Brisbane the varieties of suitable shade trees are numerous, and the would-be planter can select to his heart's content.

For the front garden, here are a few:—Camphor laurel, Eleocarpus, Eugenia, Sterculia, Erythrina, Jacaranda, Poinciana; tall-growing palms, as Cocos, &c., &c.

Shrubs.—Gardenia, Ligustrum, Spiræa, Camellia, Azalea, Roses, Dwarf Palms, &c., &c.

For the back garden:—*Trees*: Weeping Fig, Mulberry, Loquat, Mango, Moreton Bay Chestnut. If plenty of room, Moreton Bay Fig. Palms of tall-growing sorts, &c., &c.

A few shrubs in corners will help to give effect.

Never plant Weeping Figs or Moreton Bay Figs near a drain, as the roots will effectually choke it. Don't plant Bunyas or Hoop Pines near a house; they are both dirty and dangerous Avoid bamboos in any part of the garden. Never plant a Phytolacca near a fence or brick wall; the roots will burst either.

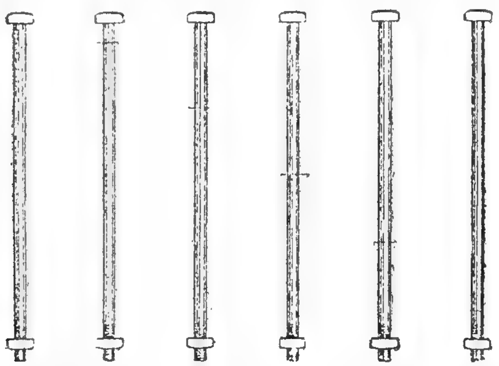
A few creepers, climbers, or twiners look well on a fence or trellis, such as Bignonia, Tecoma, Wistaria, Ampelopsis, Antigonon, Hoya, Stephanotis, Roses, &c.

Robust-growing plants, suitable for covering unsightly buildings or very high trellis, are Bougainvillæ, Bignonia, Passiflora, &c.

It is next to impossible to enumerate the variety of flowering plants suitable for the flower borders, but by a little judicious selection a supply of cut blooms can be maintained from January to December even in the humblest cottage garden.

SIMPLE METHOD OF LENGTHENING BOLTS.

The following method of lengthening bolts is contributed by Mr. Jonathan Volz, Hildreth, Nebraska, to the *Blacksmith and Wheelwright*, N.Y.:—I enclose a sketch showing how I did a job of lengthening bolts that is at once simple and economical. A customer brought me six bolts 10 inches long, which he wanted lengthening to 12 inches. I did it by cutting 2 inches off the threaded end of the first bolt; then I cut 4 inches off the threaded end of the



second bolt, and welded it to the 8-inch piece of the first bolt. This method was repeated up to the fifth bolt, lengthening the piece each time, so that when I got down to the sixth bolt, I had only to put a piece in between the head of the bolt and the threaded end, and I had accomplished the job with one weld to each bolt, except the last one, on which two welds did the work. This method, of course, saved me cutting the threads, and was a very satisfactory job when finished.

Tropical Industries.

TOBACCO AT TEXAS.

Since the temporary establishment of a State Tobacco Farm at Texas under the superintendence of Mr. R. S. Neville, tobacco expert to the Agricultural Department, considerable impetus has been given to the industry. In the past, large sums were certainly paid to growers of the leaf, but owing to various causes—amongst them, we believe, faulty curing—the price of Queensland-grown leaf fell to so low a point that many abandoned tobacco-growing and turned their land to other uses. Mr. Neville, however, has been so indefatigable in instructing farmers in the most up-to-date and yet simplest methods of preparing the seed-beds, and in the after-cultivation and subsequent treatment of the plant, that the industry has revived, and in September of this year Brisbane buyers bought leaf in the Texas and Inglewood districts to the amount of £18,000. In fact, the whole of the tobacco grown by the Chinese and European farmers has practically been bought up at 6d. per lb. Within a week there might be seen in Stanthorpe the encouraging sight of several twelve-horse wagons laden with bales of Texas tobacco to be railed to Brisbane. Texas is a charming little township on the Severn River which here forms the boundary between New South Wales and Queensland. It is distant by coach about 78 miles from Stanthorpe. The road cannot be called a good one by any stretch of imagination, especially in wet weather. It passes over a succession of steep stony ridges, alternating with pleasant flats, and intersected by several fine creeks of clear running water. In a rainy season these creeks are often impassable, there being no bridges, and travellers may be compelled to camp for three or four days without being able to obtain any supplies. After surmounting the first sets of hills, the road runs almost continuously down-hill from Pikedale to Texas. The return journey is consequently a very laborious business for horses and passengers. The time taken for the journey, including one stoppage for breakfast, 12 miles from Stanthorpe, is 15 hours. For several miles the road runs through a most inhospitable-looking cyprus pine forest, where scarcely any grass is visible, but water is everywhere plentiful. Pikedale, Tereka, Warroo, and Texas stations are passed through, and at these places horses are changed. The stages, with one exception, are very long, 22 miles in one instance, 17 and 15 in others, and the exception is only 9 miles, this stage being very rough and steep. Long before the township is reached the country changes rapidly into beautiful grass land, and on all sides, right up to the hilltops, tens of thousands of acres are ringbarked. Very good crops of lucerne, barley, and oats are seen on the way as well as some nicely-kept orchards. There are two very good hotels in Texas where the traveller enjoys as much comfort as in more pretentious city hotels. Situated on the side of a ridge the upper township commands a pretty view of the lower township, or the Flat as it is called, where there are several small plots now being cultivated by Chinese.

The State experiment farm is situated about two miles from the township, and forms a portion of Texas head station, the owners of which have leased the land to the Department of Agriculture for a term of three years. The soil consists of a deep, rich, sandy loam. This was ploughed last year to a depth of 10 inches, and 9 acres were planted with tobacco, a small area only being put under maize, melons, and vegetables. It was rather late in the season when Mr. Neville began operations, nevertheless he succeeded in raising a very fair crop of 6 tons of first-class pipe tobacco. This has all been well cured, and at the time of my visit was being prepared for market. Instead of being packed in bales, it will be screwed into hogsheads after the American plan. The

curing houses, of which there are two, are built and arranged after the most approved plan, allowing of perfect ventilation, and of being securely closed against rain-storms. Each house is 72 feet long by 40 feet wide, with a height of 20 feet. There are six ventilators on the ridge cap, six narrow side openings, which are closed at will, and the whole of the front and back ends consist of wide doors, allowing ingress for horse and dray. The poles on which the tobacco is hung to cure are about 4 ft. 8 in. long, and hundreds of these are arranged in three tiers the whole length of the buildings and right up to the roof, supported on cross-beams, from which they are easily taken down, filled, or emptied and replaced. Each shed is capable of holding 5 tons of cured leaf. The work of preparing it for market is performed by the overseer, who is himself an enthusiastic and practical man, both in growing and handling tobacco, and two young girls, but Mr. Neville himself assists in the work daily until the whole is completed.

The crop last season was of exceptionally good quality, but Mr. Neville declares that he can produce even a better sample, provided always that the season is propitious, as he has been able to take time by the forelock this year and raise young plants in his seed-bed six weeks earlier than was the case last year. The land also has been ploughed two inches deeper, and is in splendid tilth. The seed-beds are very extensive, long and narrow, and carefully guarded from predacious egg-laying, leaf-eating insects by calico closely attached to the boards forming the sides and ends of the beds.

Before sowing the seed, the soil is thoroughly burnt to destroy all animal and vegetable life which might be injurious to the seed or young plant.

The earliest sown seed was all up and healthy looking. Young plants were seen in thousands under their protecting canopy.

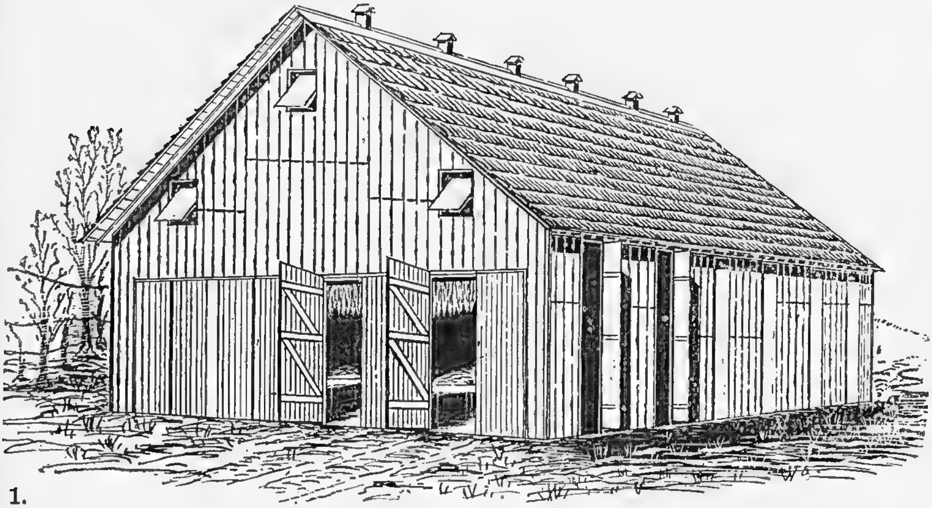
Water is procured at a depth of 17 feet from the surface. There are seven wells on the land now being planted (18 acres). Each is provided with a pump and a half-tank. The water is pumped into these and ærated before applied to the plants. The important business of watering is never neglected when found necessary. Caterpillars, which are so apt to infest the growing plant, are carefully removed, and constant inspection is made of the leaves to detect and destroy these destructive pests.

Two kinds of tobacco were cured last season, the Burley turning out a splendid sample of leaf. Many are under the impression that a large amount of labour is necessary for tobacco-growing. That this is not so has been amply proved by Mr. Neville, who has worked the State farm right through from start to finish of the crop with one young ploughman, one general hand, and the overseer, with the extra assistance of two girls in the shed during the preparation of the tobacco for market. Good tobacco land is worth at present from £10 to £14 per acre.

TRIPLE-EYED JOINTS IN SUGAR-CANE.

Mr. E. Denman, Mackay, who has made a long study of the manner of growth and other peculiarities of different varieties of sugar-cane writes:—Possibly the accompanying fact may interest you. Last year I planted a quantity of a variety of cane locally known as Striped Tanna. When cutting it early this month, I noticed that a large number of canes, after making about 2 feet of cane of the variety planted, changed into a green cane. This of itself is not very remarkable, but on closer observation I discovered that many of the joints of the new growths had in every instance two and three perfectly formed and quite distinct eyes on the same joint. This is a peculiarity that has only come under my observation on one previous occasion during thirty-five years' experience, during which period I have not only been a close observer but have made a study of canes and their peculiarities; the other instance being that of the seedling Kewensis.

Plate XVII.



1.

2.

TOBACCO SHEDS AT TEXAS.

1. State Experiment Farm Curing Shed.
2. Chinese Curing Shed.

GERMINATION EXPERIMENTS WITH SUGAR-CANE CUTTINGS.

[By Z. KAMERLING, Meded. Proefstat. Suikerriet West Java, 1900, No. 41, pp. 6-17.]

Two series of experiments were carried on, the first to ascertain the influence of fertilisers on the growth of sugar-cane cuttings (bibits), and the second to determine the effect of applying tar or Bordeaux mixture to the cut surface of the cutting.

For the first series of experiments forty pots were used, in each of which two cuttings of three eyes each were planted. The manures used were potassium phosphate, magnesium sulphate, and sulphate of ammonia. These were applied to the pots in different combinations, 10 gm. of salt in solution being used in each case. The salts had no effect upon the growth of the cuttings.

In the second series of experiments eighty-five pots planted with two-eyed cuttings were used. The cut surfaces of some of the cuttings were coated with tar, others were first washed for half-an-hour and then coated with tar. A third set was treated with Bordeaux mixture, while a fourth was treated with Bordeaux mixture after having been washed for half-an-hour. Of the cuttings treated with Bordeaux mixture, 81 per cent. of the eyes started as compared with 62 per cent. when the cuttings had been treated with tar. The former also started more promptly. When the cuttings were soaked and then treated with Bordeaux mixture, a greater number of buds started than in the unsoaked lot, and they also began growth more quickly. The soaking before applying tar hastened the commencement of growth, but did not materially increase the total germination. The author attributes the harmful effect of the tar to a clogging of the water vessels at the cut surface.

HARVESTING RICE.

Rice should not be cut too green. Many farmers do so, with the result that the grain is light and chalky, which depreciates its value. If obliged to cut it in this condition, cut it with plenty of straw. This will help greatly to mature the grain. When intending to thresh early, make the stooks very small, and do not cap them. You will find that it will be ready for threshing many days sooner than if in large, capped stooks. The reason is that with small stooks the air can pass through and the sun's heat can pass through to the inner bundles. Should, however, heavy rain and storm be threatening, then make large stooks and cap them. This will keep the rain from the heads, and the large stooks are not so liable to be blown down.

VALUE OF RICE.

The Pimpama Island ricegrowers have amply demonstrated the value of the rice crop as compared with other cereal crops. They have harvested from 30 to 50 bushels of rice per acre, and the demand for paddy for seed from various parts of the State has been so great that from 6s. to 7s. 6d. per bushel has been and is still offered for seed rice.

According to our wheat returns, the average yield per acre has been (for the harvest of 1900-1901) 15·06 bushels, whilst for rice, the yield is given as 25·35 bushels. Many of the rice farmers harvested from 40 to 50 bushels. Now, say wheat is worth 2s. 6d. per bushel. Rice is worth at this moment—paddy, that is—as stated above, from 6s. to 7s. per bushel, and for marketing purposes 4s. to 5s. per bushel. The acre of rice is therefore, on an average, worth about £6 16s., whilst the acre of wheat is worth some £1 17s. 6d. In Florida, U.S.A., the comparison is: Rice, 20·36 dollars, wheat, 8·87 dollars, or in British money, rice £4 6s. 8d., wheat £1 17s. Now, rice, the upland variety

grown in this State, is as easy to grow and to harvest as wheat, and far less trouble than maize. But rice makes a second growth and yields two or three months' excellent pasturage for stock. Wheat harvested by the stripper gives little value in the straw. The aftermath of rice and the straw of the threshed-out crops give excellent fodder and hay superior to wheaten straw.

Wheat, rye, barley, and all cereals except oats, may be cut, bound, and stacked practically at one and the same time, for when the grain is ripe the straw is dry and dead. But when rice is ready for harvesting the stalks are green and the roots are alive and ready to shoot out again as soon as the grain crop has been taken off, and hence the superior value of rice straw over that of any other cereal except oats (because oats require sun-drying in the swath). The rice requires to be harvested the moment the heads are matured, first, because the greener the straw the better the forage when cured; and second, because the earlier it is cut the better will be the aftermath.

When rice has been harvested the threshing should be delayed. It should be stacked for a fortnight. Then it undergoes a beneficial "sweat" which hardens and whitens the grain. In Florida, old rice-planters leave their rice stacked from two to four weeks before threshing.

SISAL HEMP AGAIN.

It is as yet too soon to obtain a report of results from the Sisal hemp-growers who last year obtained parcels of plants from the Department of Agriculture, as it takes at least three years before the plants are old enough to yield the first crop of leaves. We have advocated the growing of this valuable fibre, for the reason that poor land not adapted for cereal or root crops can be utilised profitably at very small expense. Some have hesitated to plant, owing to the fear that expensive machinery would be needed for preparing the fibre; others because such a large water supply is needed. In view of these objections, we place before our readers the statements of Mr. Quennel, in the journal of the Jamaica Agricultural Society. That gentleman says—

I have seen, with a deep regret, some persons rejecting at first the idea of cultivating fibre plants in Trinidad as requiring too much capital and too costly machinery.

This is a great mistake. Yukatan is there as a proof of it, because the Indians of that country export now more than 100,000 tons, prepared with a very rough machine called "raspador," a wheel of 4 feet diameter, working at 160 revolutions a minute. The cost of it cannot be, with horse gear, above 150 dollars. That machine is easy to move from one place to another. It wastes a certain amount of material, and is slow at work; but it is not the first time that the primitive appliance of the peasantry has succeeded better than costly machines and big capital, with their heavy interests and annuities. The raspador gives net 333 lb. in ten hours. A machine for working three-quarters of a ton would cost, with steam-engine and the buildings to correspond, £1,200 at least, when five raspadores would not cost more than £150.

A steam-engine would not be moveable and could not be economically established where the area under cultivation would be less than 1,000 acres.

I take my data from various reports from Dr. Morris, Imperial Commissioner of Agriculture, Barbados, and from Mr. Richard Dodge, of the Washington Fibre Investigation Committee on account of the Government of the United States.

From them I come to the conclusion that the fibre plant gives a hemp of a value of £30 a ton in London, which I reduce to £14 a ton after allowing for discount, commission, and freight, and also for cultivation and packing. This is less than the amount given in the reports referred to.

I take for planting five rows in 36 feet—that is to say, four at 6 feet distance and the fifth at 12. I put the plants 6 feet apart in the rows. This gives me more than 1,000 plants to an acre. Each plant at four years gives forty leaves a year of a weight of 50 lb., of which 4 per cent. turns into fibre, dried and white, or 2 lb. of fibre to a plant, or 2,000 lb an acre. £14 a ton is more than 3 cents a lb. I allow only 2½ cents a lb. to make 50 dollars an acre. Thus an acre producing net 50 dollars yields double the results of 200 cacao trees on an acre, at 10 bags per 1,000 trees at 12 dollars net (when 65s. the London market quotation) or 2 bags, 12 dollars = 24 dollars. It is a great deal more than 20 tons of sugar-canes to an acre at 9s. a ton, leaving probably not more than 1s. a ton to the cane farmer, or £1 an acre.

If the acre gives 2,000 lb. a year, and a raspador prepares some 330 lb. a day—100,000 lb. a year of 300 days—it will require 50 acres to produce sufficient fibre for one raspador's work in one year; 5 raspadores for 250 acres; 20 for 1,000 acres.

But what strikes me more is that I noticed that on all the sugar plantations, all the cacao estates, everywhere on Crown lands, there is a large extent of useless land, when not first-class. Well, the fibre plants grow nearly everywhere except on absolutely barren lands; and immediately everyone can foresee what is the future of Trinidad when all lands, unless barren, will be cultivated with plants yielding double what cacao gives. One thousand acres of land for sugar-canes, giving 1,500 tons of sugar, will require (if I do not make a mistake) £37,000 worth of machinery, at least; and 1,000 acres of land for fibre plants will require only twenty raspadores costing £600, and will give yearly at 50 dollars, or £10 per acre, £10,000 sterling to repay cost of land and of contracts.

But no industry can be established with safety if it is not started with economy and perseverance, or if anyone is discouraged because purchasers do not come from abroad to buy the first lb. before it is ready. I believe that this, and five or six years' gambling in the London Exchange, have stopped the first attempt made in Tobago and in Bahamas some ten years ago. But the machines have been greatly improved during the last four years; the prices, after fluctuating during the time of speculation between £13 and £75, have become steady at £30, and the plants, ten years old now, are everywhere giving sprouts from their roots and seeds from their poles.

The Agricultural Society is being called upon to decide regarding the introduction of hard-working immigrants from Teneriffe. Can we find a better basis for settlement by free companies of these free people, in a free country? Profitable contracts could be offered to them on landing at the Quay, at a rate of 25 dollars an acre—5 dollars after brushing, 5 dollars after planting, and 15 dollars on delivery on fourth year. Each contractor would not receive more than 12 acres to be planted in three years—4 acres a year. As there is very little trouble in cultivating the fibre plant when it is a year and a-half old, every year each contractor could receive some 4 acres more. In five years he would have planted 20 acres, and from the fourth to the ninth year he would receive 500 dollars, whereas 12 acres in cacao, or 2,400 trees, would give him only 480 dollars in the same time. [1 dollar = 4s. 2d. 2 cents = 1d.]

USEFUL HINTS.

If a newspaper is soaked in water, and then rolled up into a tight ball and put in the centre of a fire, with a little coal on the top, it will be bound to keep in for several hours.

A certain cure for the most long-standing corn will be found as follows:—Mix a small piece of bread with a little vinegar, apply to corn two or three nights; it will then be completely cured.

Forestry.

INFLUENCE OF FORESTS ON THE CLIMATIC CONDITIONS OF A COUNTRY.

We have, in the course of many articles on Forestry, frequently pointed out that extensive wooded areas exercise a marked influence on the climate of a country, and that the destruction of the forests is invariably followed by the deterioration of the climate. It is thus that Oskar Peschel teaches in his well-known work, "Neue Probleme der Vergleichen der Erdkunde." But he entirely omits from his calculation re-evaporation of moisture precipitated on the land, and his conclusion cannot consequently be accepted. A well-wooded forest area may best be compared to a landlord who spends his income derived from the country within it and for the benefit of his neighbours, whereas cleared areas resemble absentee proprietors who scatter their revenues in foreign parts. It rains; the drops are scattered on the leaves and fall in a soft gentle spray or in slow falling big drops, which have collected on the foliage, on to the spongy forest ground.

The water has thus time to percolate slowly into the soil below, whence a large quantity is gradually pumped up again through the roots of the forest trees, exhaled by their leaves, and again assists in forming rain clouds. Wooded areas, no doubt, extract under the same circumstances more moisture out of the air than disforested regions, but they serve as a store-house and yield again what they take, whereas a great portion of the water precipitated on barren soil is only recovered by evaporation from rivers, lakes, and oceans. Forests use, therefore, much less moisture than barren areas in the same position and under similar conditions, and augment the atmospheric moisture in regard to regions which are separated by such forests from the sea instead of diminishing it. Their action in this respect is not the same thing as that of an intervening mountain range.

In Assam, which is a broad, isolated, well-wooded valley, rain-clouds form in the winter, and it rains when no air-currents reach it from the sea. The clouds are home-born, and are to some extent, at least, due to re-evaporation from the vast forest areas still in existence. The same laws naturally apply to any locality, though they may not be so strikingly exemplified. It may be argued that evaporation from open ground is much more intense than from soil covered by forests. No doubt this is the case, and Ebermayer, in his "die Physikalischen Einwirkungen des Waldes auf Luft und Boden," gives the following data:—"The forest alone, without the cover of dead leaves diminishes the evaporations by 62 per cent. as compared with that in the open. Evaporation is consequently 2·6 times less in the forests. A covering of dead leaves and vegetable mould diminishes evaporation by a further 22 per cent. Forests with an undisturbed covering of dead leaves and vegetable mould lessen the evaporation as compared with that in the open by 84 per cent.

These data are based on observations made in Bavaria during the summer months. In the Indian climate the difference, which increases in proportion to the heat and dryness of the atmosphere, would be even more considerable.

The above data refer to the evaporation from the soil, which, of course, can only take place as long as there is water on the surface, which in the open is not the case for long, as it either flows off or gravitates out of reach of the influence of evaporation. In a forest the water does not flow off with the same rapidity, and much of that which gravitates into the soil is pumped back by the long roots of the forest trees, and especially during the period of vegetation is exhaled by the leaves in quantities which represent far more than the moisture evaporated from the open ground. There can be no doubt, whatever may be said to the contrary, that the widely-spread notion that forests tend to increase

the rainfall, and that in a warm country they diminish its moisture, and consequently its fertility, is correct. As already pointed out, the theory is proved by history and ruins, and the rapidity with which changes in the climate of different countries have taken place entirely forbids that such sudden modifications should be ascribed to cosmic causes. We accept other scientific problems on much more flimsy evidence, but in this instance a large number of us suddenly swerve aside and follow a school which starts new theories on partial observations and leaves re-evaporation out of consideration. Ebermayer found from experiments made that during July the hottest month in Bavaria, only 6 per cent. filtered down to any depth in a forest the ground of which was covered with complete and undisturbed vegetable mould.

In the one case the water rapidly runs off into streams and seas by sudden floods and freshets, and this too when the whole atmosphere is surcharged with moisture. In the other instance the water is stored for re-evaporation through the foliage of the forests, and is given forth at the time when the air is drier and the winds do not blow from the sea. It may be safely stated that more than the rain which is thus stored in the ground is re-evaporated by the trees in time of need, and even at this low computation a well-stocked, a well-protected forest area, the vegetable mould of which is undisturbed by either fire or the axe or rake of the "rab" or "sir" collector would re-supply to the atmosphere at least one-third of the moisture which is precipitated on it. This would be available for the open country. If, therefore, 30 per cent. of the country was under complete forest, the rainfall should increase by 10 per cent. under conditions similar to those which exist in Bavaria in July.

In India, or any other country with such a fierce climate as ours, the influence should be more marked.

The monsoons in India, it is argued, must be quite independent of forest growth. Quite so. Forests can have no influence whatever on the amount of moisture drawn from the ocean, and the general direction of the winds is unquestionably governed by greater causes, but, apart from this, periodical rains are subject to the same general laws as all other rains, and must, therefore, be affected by the same causes, and amongst them by extensive forest growth, in exactly the same way and degree. The air may be charged with moisture which need not, however, be precipitated. If an extensive snowfall in the outer Himalayas can affect the monsoon rainfall, it seems certain that forests can do the same, though probably not to the same degree.—"Forestry in British India," by B. Ribbentrop.

PRESERVING SWEET CHILLIE PEPPERS.

During the winter chillie peppers are not plentiful, but with very little trouble a constant supply may be maintained. A correspondent gives the following directions for stringing chillies:—

When the chillies are ripening go over the field once a week, picking all the ripe ones. Leave a long stem on the pod. Expose them to the sun for a day to toughen the skin and stems. Then with a long slim needle sling them through the stem on strong twine eight or nine feet long. When the twine is full, hang it up in a dry cool shed where there is plenty of ventilation. Be careful not to string any poor or damaged pods. When dry store them in a dry, cool room, hanging them on poles or nails.

These dry chillies are used in making beef stews with boiled beans, &c.

For a stew, take 1 lb. or 2 lb. of beef with a little fat. Cut the beef and fat into ½-inch squares, and boil till tender. Then take ten dried chillies, and remove the seeds from all but one pod. Boil the chillies for five minutes. Then with a knife scrape off all the red pulp from the skins. Put this pulp back into the water and boil for five minutes. Keep it stirred till it is all dissolved, then add it to the stew. Let the whole boil for a minute or two, and thicken with a very little flour.

Science.

PERFUME PLANTS.

Mons. J. Chapelle, Departmental Professor of Agriculture of the Var, France, presented a very interesting and valuable report on the perfume industry in France to the sixth International Agricultural Congress held at Paris in July, 1900. This has been republished in the *Révue Générale Agronomique*, from which journal we take the following extracts, which will doubtless prove of value to those who are interested in scent-farming:—

Extraction of Perfumes and Essential Oils.

The extraction of the scents contained either in the branches, in the leaves, and, above all, in the flowers of plants [enumerated in a previous article—Ed. *Q.A.J.*] is a delicate and complex operation.

According to the very just definition of M. Rouché, chemical engineer, scent should possess the two following qualities:—

1. It should recall the true odour of the substance from which it is extracted.
2. It should, when exposed to the air, be completely unchangeable, and of sufficient permanence.

In two words, it must be perfect and durable.

These two essential qualities are realised in a more or less perfect manner by the aid of the principal methods of extraction in general use—viz., distillation, maceration or hot process of extraction, absorption or cold process, dissolution, expression.

The flowers gathered under favourable conditions of blooming and sunshine must be treated at once, to avoid withering, the alteration of the very subtle perfume principle contained in their epidermic cells.

Distillation is resorted to in the case of flowers or plants which undergo no alteration in the presence of steam or from a high temperature.

By this process are treated certain scented woods, leaves, and plants, such as mint, lavender, rosemary, thyme, &c., rose and orange flowers.

The many details of this operation vary, so to speak, with each plant, and the apparatus used is consequently of different construction.

For the distillation of wild plants, lavender, rosemary, thyme, &c., very primitive stills with open fires are used in the country. But in the great factories which treat daily a considerable quantity of very delicate perfume plants, large and most perfect apparatus are employed which enable the operator to avoid burning, the contact of the contents with the sides, the agglomeration of the substances treated, &c.

To distil, in certain cases, in the air or in a vacuum, in order to obtain the finest scents. To carry out methodical distillations and to separate the different products, to rapidly collect the essential oils, &c.

The vessels, or Florence flasks used for collecting the latter, are of different shapes, but all are on the same principle, which is to effect the separation of two fluids of unequal density during the distillation.

Maceration or Extraction by Heat.—Certain flowers such as cassia, violets, jonquille, cannot be distilled owing to the small quantity of perfume contained in them, and to the perfume being likely to undergo a change in a high temperature. In this case advantage is taken of the property possessed by fatty bodies of absorbing the essential oils by simple contact with the odoriferous plants.

For preference, lard is used which has to undergo a special preparation to remove its odour and to prevent its becoming rancid.

Olive oil requires no special preparation. It is sufficient for it to be good, neutral, thoroughly refined, and inodorous. For the same purpose glycerine, paraffin, and vaseline have been successfully employed.

The flowers are placed for from twelve to forty-eight hours in these fatty substances heated to a maximum temperature of 65 degrees. The exhausted flowers are replaced by fresh ones. When successive renewals have been made from ten to twenty-five times, the fatty bodies have acquired the requisite perfumed strength, which is indicated by the figures 6, 12, 18, 24, 36, according to the intensity of the perfume.

This operation is performed by women. Each has her receptacle or trough containing from 100 to 150 kilogrammes of lard, in which she stirs the flowers continually.

In order to recover the fatty bodies, the exhausted flowers are passed through a hydraulic press. The scent-saturated lard is put through a sieve and run into immense tin cases, and constitutes the concentrated *pommade*. Many compounds containing orange and rose flowers are prepared by this method.

Absorption or Cold Process.—The action of heat is entirely dispensed with in the case of flowers with a very volatile scent such as jasmine, tuberose, heliotrope, and with these the cold process is adopted. Frameworks are made use of 0m. 08 in depth ($3\frac{1}{5}$ inches), 0m. 60 broad (25 inches), and 1 metre long (3·2 feet), the bottom made of glass on which is spread a layer of purified lard or of vaseline, and on that a bed of flower petals. These flowers are renewed daily during the whole flowering season.

When oil is used, pieces of cloth are saturated with olive oil of the best quality stretched on the framework, and on these the flowers are deposited. When the operation is complete these cloths are subjected to strong pressure to express the perfumed oil.

The lard and perfumed oil, mixed with alcohol, produce the alcoholic extracts used in perfumery. The extraction is generally a very tedious business. It demands valuable material of a costly nature, and often the resulting products are more or less stained or altered by a slight odour of fat or oil which depreciates their value.

Lately, Mons. Piver has perfected this process by avoiding the contact between the fatty body and the scented matter and transferring the perfume of the flower to the lard by a current of air or gas.

In this process, called *pneumatic*, the air passes several times into a vessel containing fatty substances divided into very fine particles.

The neutral oil may yet advantageously replace the lard in this new system.

Dissolution.—In 1835, a French chemist, Robiquet, first conceived the idea of substituting, for fatty substances, dissolvents more easy to handle and requiring less expenditure.

The principle of dissolution consists in immersing the flowers in a dissolvent (sulphuret of carbon or petroleum spirit) which absorbs their scent. This liquid, subjected to a current of steam, yields up the dissolved perfume in all the perfection it possessed whilst in the plant; it is then restored to a state of absolute purity for further use.

Concrete essential oils are thus obtained, having a perfume a hundred times greater, it appears, than that of the *pommades* obtained by the methods of extraction already mentioned.

Present Condition of the Cultivation of Scent-plants and of the Manufacture of Essential Oils.

From the economic point of view, the position of the cultivators of scent-plants is not as brilliant as might be supposed.

This industry, which was very remunerative some years ago, has greatly extended, particularly in the Grasse district, in Algeria, and in certain parts of Italian Liguria, following the example of Provence. This very important increase in the area under flowers has forcibly brought about an over-production

of flowers, whose value is subordinated to a daily transaction by a sort of monopoly. Since about twenty years, the price of flowers has lessened alarmingly. For example, orange blossoms have fallen successively from 2 francs (1s. 8d.), and 2 fr. 50 (2s. 1d.) to 25 centimes and 50 centimes (2½d. to 5d.) per kilogramme (2⅕ lb.); roses from 60 cent. and 70 cent. (6d. and 7d.) to 35 cent. and 40 cent. (3½d. and 4d.) per kilo.; Jessamine from 3 fr. 25 (2s. 8½d.) and 3 fr. (2s. 6d.) to 75 cent. and 1 fr. (7½d. and 10d.) per kilo.

Violets have fallen by 50 per cent. in a single year, 1898 to 1899. And other blooms have suffered in the same degree.

Under these conditions the profits, usually very small, often *nil*. to the growers, now no longer pay for the cost of growing, cultivating, and gathering the crops.

In our opinion, if this depreciation continues, the importance of the flower-growing industry will soon rapidly diminish.

In the interests of all concerned, we think it would be wise and prudent to form a sort of syndical chamber, composed of producers and scent-makers, to prevent the horticultural and industrial disaster which threatens the district of Grasse and its environs.

This association of persons interested in the trade would be able to appraise and to limit the production of flowers required in the industry and in trade, whilst maintaining an equitable price for the raw material, such as would enable the growers to make a modest but sure livelihood.

Let us point out another dark spot from an economic point of view. We allude to the competition which chemically-produced scents are already entering into with the natural perfumes.

Since chemical analysis has discovered in certain natural essences compound *æthers* which they have been able to reproduce by synthesis, artificial preparations of new odoriferous products have developed both at home and abroad to an extent which endangers the future of French perfumery.

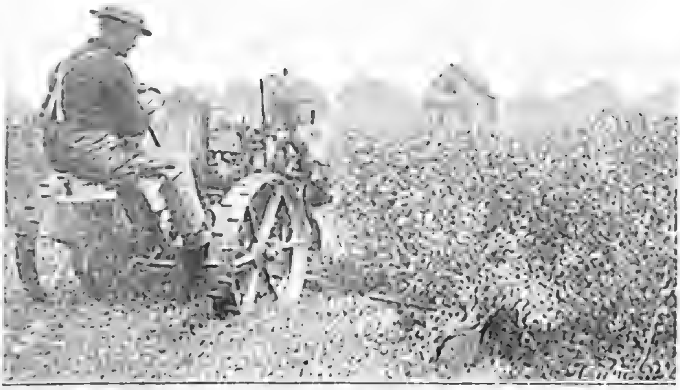
These artificial essences, produced often by the combination of elements infected with some odour—aldehydes, acetones, alcohols, ethers—are generally, it is true, of extreme strength, but also of great permanence. At the same time, they cannot equal the fineness, the softness, or the attractiveness of the natural perfumes, whose delicious emanations give the illusion of the presence of the flowers whence they have derived their aroma.

For use, chemical perfumes require to be disguised and sweetened by means of the natural extracts. These compounds are products of inferior quality which cannot compete with the exquisite and delicate perfume extracted from flowers. The latter, we trust, will always retain its luxurious customers, whilst the mixed, or merely artificial scents, thanks to their price and more restricted sale, will, on the other hand, find their way amongst a less refined and less exacting class.

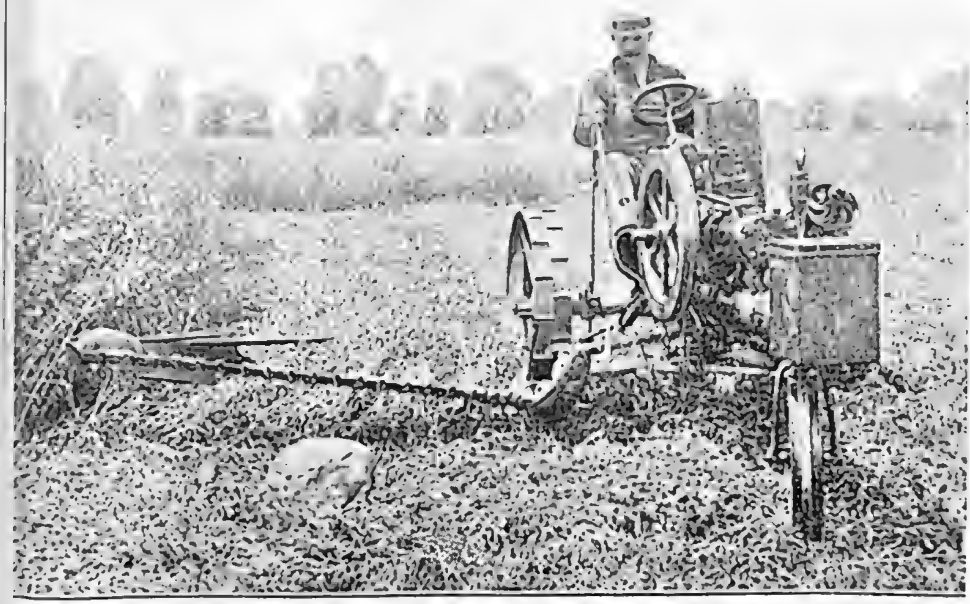
AN AUTOMOBILE MOWER.

The automobile (says the *Scientific American*) is destined to become a great power in agriculture. It is true that for many years we have had various machines propelled by steam, such as traction engines, steam threshers, &c., but they can hardly be termed automobiles. Realising that the time was coming when, even in agriculture, horses would be dispensed with to some extent, the Deering Harvester Company, of Chicago, Illinois, began experimenting as far back as 1894, in order to devise means of driving harvesting machines by motors. They succeded so well in their experiments that an automobile mowing machine was placed on exhibition in the American agricultural annexe of the Paris Exhibition last year, where it formed one of the most interesting exhibits. The duplicate of this machine, so far as all practical purposes are concerned, was tested in France in competition with other machines, and was found to work perfectly, running at any speed and turning corners more easily than a team of horses.

Plate XVIII.



THE DEERING AUTOMOBILE MOWER.



THE DEERING AUTOMOBILE MOWING MACHINE IN USE.

The type of harvester used is known as the "Ideal" mower, equipped with ball and roller bearings and propelled by a gasoline motor which consists of a pair of four-cycle gasoline engines of 6-horse power, mounted tandem on a large pipe 6 inches in diameter and 5 feet long. The rear of this pipe is adapted to be secured to the mower frame the same as an ordinary draft tongue, and the front end is supported by a steering wheel. The large pipe serves not only as a bed for the motor, but also as a reservoir, in the middle part, for the gasoline and as exhaust chambers at its front and rear ends, one chamber for each cylinder respectively.

Then follows a technical description of the machinery. Although the driving devices are designed primarily for a mowing machine, it is adapted to a variety of purposes. By simply disengaging the cutting apparatus, it may be used as a portable agricultural engine for drawing loads about the farm, grinding feed, pumping water, sawing wood, or any other purpose for which an engine is valuable.

There is hardly a country in the world where gasoline cannot be obtained, and we trust that there will be a great future for machines of the type here illustrated.

A previous notice of this machine stated that one man could cut 30 acres a day.

A Hint about Oil Mills.

By W. SOUTTER, Inspector of State Farms.

Among the many industries that have been started in Queensland during the past fifteen years it is somewhat surprising that the oil industry has had no representation. Surely in a country possessing such variety of soil and climatic conditions as does this fair State of ours the oil industry should prove a profitable undertaking, for the following reasons:—In the first place there is practically an unlimited market for paint oils within the confines of the Commonwealth, as there are few countries that use more paint than does Australia. This may be accounted for by the Oceanic style of buildings which are chiefly of wood. In the second place it has been proved beyond doubt that almost every known variety of oil-yielding seed can be produced in Queensland, the diversity of climate and soil conditions rendering this possible.

Whether the farmer can grow and market the seed at a profit has yet to be proved, as hitherto the absence of a local market for them has prevented him from testing their value; but I feel assured that almost any of the oil-yielding plants will return a larger profit than does wheat-growing, while there need be no fresh outlay on the part of the farmer in the way of machinery. While, with perhaps the exception of cotton, the actual cost of producing the crop will be no more than that of growing either corn, wheat, or potatoes.

As is well known, cotton has been grown in the State of Queensland for many years with varying success. But the staple only has been all that was aimed at; the seed has never been utilised for oil purposes, hence a valuable product which could have been profitably turned to account was wasted.

The sunflower, another oil plant, can be grown as easily as maize, and will produce about an equal weight of grain.

Linseed is a crop which is about on all-fours with wheat or barley, the cultivation and handling being practically the same, while the yield will be equal to if not greater than that of those cereals. Many of our wheat-growing areas are admirably adapted for the cultivation of linseed. The sunflower will succeed in any region where maize can be grown.

Castor.—This plant flourishes in favoured localities along the entire seaboard; and although only small attempts have been made to grow it on system, the attempts bear out the fact that, under cultivation, the yield of seed is increased by systematic planting and pruning. The late Dr. J.

Bancroft and the writer carried out a series of experiments in this direction about fifteen years ago, and the results were most satisfactory. There are several varieties of this plant, which have recently been brought into notice, that are reputed to be much more prolific as seed bearers than the common one frequently found in vacant allotments, and in habit of growth are more dwarfed.

RAPE.—This crop is about as easily grown as a crop of turnips, and the seed yields a useful oil.

PEANUT (Earthnut).—This plant will grow in almost any part of the State, and although some difficulty is experienced in harvesting the nuts, this will no doubt be overcome by the aid of mechanical means. Thousands of tons of these nuts are annually exported from Northern Africa for treatment by the English, French, and German oil-millers. There are other oil seeds, such as hemp, gingilly, &c., all of which can be produced in Queensland, while the tropical North may some day produce cocoanuts in large quantity and other tropical oil-yielding seeds less in importance, but furnishing useful and valuable oils.

Although Nature has been bountiful in supplying every condition for the successful cultivation of oil plants in this State, yet those who would venture to embark in the production of oil seeds have to face the fact that the market is too far distant to leave a margin of profit after deducting the freight and dues. The only remedy, therefore, is to endeavour to bring the market nearer, and this can only be done by bringing the oil-miller alongside the raw material. The actual outlay in erecting an up-to-date oil-mill is not large, as will be seen by the following table. The prices given are, of course, liable to a slight variation, but in round figures they approximately land near the mark. Freight to be added:—

Linseed—Cwt. per Day.	Cotton—Cwt. per Day.	Rape Seed—Cwt. per Day.	Castor—Cwt. per Day.	Cocoanut—Cwt. per Day.	Cost.
		No. 1 Mill.			
30 to 40	35 to 45	20 to 40	30 to 45	20 to 40	£ 750
		No. 2 Mill.			
40 to 60	60 to 70	35 to 50	40 to 70	30 to 50	1,050
		No. 3 Mill.			
100 to 130	110 to 140	70 to 100	100 to 150	70 to 120	2,400
		No. 4 Mill.			
150 to 200	150 to 180	150 to 180	160 to 200	100 to 150	3,000

The No. 4 mill will consist of the following parts:—

4 Hydraulic Presses
1 Set Hydraulic Pumps
1 10-inch Gauge, with all Pipes
1 Set Steel Rolls
1 Seed Kettle
1 Moulding Machine
1 Paring Machine
1 Set Edge Stones
1 Set Elevators
1 Screw Gear
1 Sack Lift
1 Oil-pump and Cistern
1 Seed Screen
All Gearing, including Columns, Girders, and Piping
Oil Cisterns, 50 tons capacity, with Taps, Pipes, &c.
1 Horizontal Engine, 14-inch Cylinder, 24-inch Stroke, with Suitable Boiler and Mountings

The whole weighing about 93 tons.

The foregoing has been penned, not with any view of inducing the farmer to embark in an oil-mill of his own, as the cost of same is beyond his reach, neither to venture to run an oil-mill on his own account, as skilled labour is needed to make oil, but merely to show that there is at least one industry affecting his interests that has not yet been undertaken. It may also be the means of inducing men with the necessary capital to take the matter in hand, and thus find another string for the farmer's bow.

Animal Pathology.

MEAT AND MEAT INSPECTION.

At the annual meeting of the National Veterinary Association in Edinburgh last August, a most valuable paper on "Meat Inspection" was read by Mr. James McPhail, M.R.C.V.S., Edinburgh, which, taken in connection with what is being said, done, and written in the same direction in this State of Queensland, cannot fail to prove of exceptional interest to all who are engaged either in pastoral pursuits or in dairying. The following abridged notice of the paper appeared in the last August issue of the *Scottish Farmer* :—

Mr. McPhail said there was one point in connection with this piece of legislation which was of interest—namely, that to Scotland belonged the honour of being the first country in Great Britain to recognise the veterinarian as an expert in matters appertaining to meat inspection, and they could only hope that the same energy with which the Scottish veterinary surgeons emphasised their claims and obtained their recognition might be shown by their brethren in the profession when a revision of the Public Health Acts in England and Ireland occurred. It was mainly with the carcasses coming daily under the notice of the inspecting veterinary surgeon that he intended to deal. He purposely refrained from entering on a pathological treatise on their condition, and confined himself to a general description of those conditions which rendered them, in the words of the Act, "diseased or unsound, or unfit for the food of man." Perhaps the first point of importance claiming their attention at this stage was the difficulty in laying down a standard capable of general application. To this end, the words he had just quoted should present less ambiguity to the mind of the veterinarian than they had hitherto done.

To illustrate the latitude which existed among those entrusted with the administration of the Public Health Act he need only instance the fact that many carcasses were condemned in one city on account of emaciation which, in another city, would pass as good lean meat. To make his position clear, they would take it that the inspecting veterinary surgeon's duty was to intercept all meat calculated to prejudice the consumer without at the same time imposing undue hardships on the seller, and, further, he must take into consideration not only the condition of the meat when he examined it, but the condition it might assume before it reached the consumer. Some carcasses which were on the border line, if he might so express it, would not improve by being conveyed from place to place, and might in a couple of days become unfit for food. This was a rather serious consideration, as it cast a reflection on the value of any certificate which might have been granted. Before proceeding with a description of meat, as he proposed dealing with it, perhaps it might be well to divide it into two general classes :—

1. The flesh of animals intended for the market and fed for such a trade, and which had been slaughtered in the regular course of business; and
2. The flesh of animals which had been slaughtered while in some stage of disease or suffering from some minor ailment, and which he would refer to as "accidental beef."

I.—Flesh Intended for Food.

The first-named class embraced home-bred, foreign-bred, refrigerated beef, and frozen beef. Home-bred and killed included bull, ox, heifer, cow, sheep, pig, calf, and goat. Foreign-bred (American and Canadian), but killed in this country, consisted almost entirely of ox and bull beef. It was well fed and of good quality. The Americans were now reaping their reward for their previous

importations of the best of British stock. Refrigerated beef, killed and dressed abroad (American, Canadian, Dutch, Danish, and German), was generally of fair quality, but one sometimes discovered an old cow palmed off. These carcasses were generally inspected at the port of despatch.

FROZEN BEEF was frozen right through, and was as hard as a board. This variety was easily recognised by the moisture which was oozing from it as it gradually "thawed out." The danger in connection with this class of meat was that it might be subjected to the freezing process before the animal heat had left the body, the outside only becoming frozen. It might be quite good to all appearance, yet decomposition might exist in the interior or frozen parts. Frozen meat of all descriptions should be examined by cutting clean through and observing the condition of the meat close to the bone. In this way the slightest taint was discernible. Mr. McPhail then proceeded to enumerate sixteen diseases to be found in home-bred-and-killed beef, and gave details of the practical method of inspection in each case. Dealing first with Tuberculosis, he said that this disease, as seen in the slaughter-houses, was of two kinds The first occurred as a gelatinous, purplish-looking deposit on the pleura and peritoneum, and could easily be rubbed off with a cloth. The lymphatic glands were only softened and enlarged, and they did not contain any caseous masses. It was important, in condemning any of these carcasses, to secure the viscera also, as this form of the disease had a most unhappy way of drying in, and where a beautiful deposit was observed when first inspected, in most cases, several hours after the exposure to air, very little of the deposit might be seen, and this was not very satisfactory to the owner, who generally liked to see something to condemn his carcass for.

The second form was commonly known as "fixed tubercle" and "grapes." In this form the disease was of a more chronic nature, and there was present the formation of nodules with calcareous deposition in them, the glands of the affected region were generally invaded, and there were caseous or calcareous nodules also in them. On the subject of the condemnation or passing of such meat much had been advanced on both sides. Argument and interest had circled round this point, and papers innumerable had been read and discussed in recent years; but while retaining his own private views, he could only point to the recommendations of the Royal Commission—namely, to pass localised tubercle, and condemn the carcass when the disease had become generalised. The responsibility remained with them if the standard they had recommended be not high enough. There was one feature of the subject of special importance in this connection. No examination of such carcasses could be too careful, because if the glands of the carcass were carefully examined the lesions of the disease would be found cropping up here and there. He had seen many a carcass which would be called "clean," yet found to be badly affected with tubercle in the glands of the body.

Actinomycosis was generally seen in the localised form affecting the tongue and pharynx and the bones of the lower jaw. Sometimes it occurred in a generalised form, and was liable to be mistaken for tubercle, the lungs, pleura, and udder being the seat of the lesion. The lungs contained minute nodules purulent on section, but they were not so numerous as in tubercle. On the pleuræ were clusters of nodules similar to the "grape" form of the tuberculosis, but they were rather more fibrous than in the other disease. Regarding the passing of this meat, Mr. McPhail said that when they considered the low infectivity of the organism there was no doubt but that if the carcass was otherwise a good one, and if the disease was in the local form, it should be passed, and the affected parts destroyed.

Dealing next with pleurisy, Mr. McPhail said this form of disease was easily recognised, owing to the vegetations occurring on the pleura, and to the thickening of these membranes. In this condition it was impossible to pass the meat. It was very dark, and if the fingers were passed over the cut surface, and then rubbed together, they would be felt to be quite "soapy." In the

latter stages of this disease, when pleurisy had healed and resolution had taken place, the meat had usually regained its tone, and should be passed; but, nevertheless, such carcasses should always be "ribbed," for in this disease the flesh always took longer to right itself than was the case in other minor ailments.

With regard to anthrax, Mr. McPhail said this disease was easily recognised when well advanced. The interior of the carcass had the appearance of being drenched with blood. The flesh was dark in colour, and did not set; there were extravasations of blood into the muscles and into the heart substance. The spleen was enlarged, the tissue of that organ being broken down, until the whole resembled simply a bag of blood. Such was a typical case, and the flesh of such an animal would, of course, be condemned. Sometimes, however, the animals were killed in the early stages of the disease. In this condition the flesh was pale and of a "slaty" hue, presenting a parboiled appearance and having a peculiar sickly odour. Any carcass showing such physical appearances should, in addition to being condemned, be carefully examined for anthrax bacilli.

Dealing with blackleg, Mr. McPhail said that in the early stages the flesh of an animal suffering from this disease did not show marked changes; but, should the disease be at all advanced, it was dark and soft, and would not set. The odour from this disease distinctly resembled that of rancid butter, and if a piece of the meat was cooked the same smell was present, even after cooking. The flesh of an animal suffering from this disease should be condemned.

With regard to parasitical bronchitis, Mr. McPhail said the lesions were easily recognised, for if the affected lungs were cut into and squeezed the parasites were easily seen under an ordinary lens. The bronchii were always filled with a frothy liquid. Unless the carcass was emaciated from aggravated disease, it might be passed, but the lungs must not be passed.

Phthisis verminalis was more common than the last-mentioned, and was of two forms. The first form occurred as greyish-yellow patches, irregularly angular in shape, and projecting slightly above the surrounding lung tissue, but they never occurred in the depth of the lung substance. In the other form the lesions were about the size of rabbit shot, greyish-yellow in colour, and firm on pressure. This form was caused by a long filiform worm, coiled upon itself. Neither of these forms of parasitical pneumonia affected the animal. The carcass was generally well nourished, so it might be passed, but the lungs should be condemned.

Peritonitis might be caused by foreign bodies penetrating the bowels, and thus allowing the escape of the fluid contents, or it might be caused by one animal jumping on another and falling with its legs apart. In the primary stages there was congestion of the blood vessels lining the abdominal cavity, with serum appearing in the abdomen. If the cause should be of a septic nature then a bad odour was present; and in a bad case there were adhesions. The accompanying fever reflected sufficiently on the beef to warrant its condemnation. Among the animals sent to the slaughter-house, the carcasses of which were destroyed, the liver was found to be the organ of all others most commonly affected. If jaundice had not been induced the carcass might be passed and the organ retained. A carcass of an animal suffering from this form of disease should only be condemned when emaciated. Local abscesses were very common, and might be of considerable dimensions. They occurred in various parts of the body, but were specially common in the region of the liver. The carcasses where these were most frequently met with were those of Irish cattle. Though the carcasses should be passed, care ought to be taken in dressing the carcass to prevent any possibility of contamination of other parts during removal. Over-driving had a most deleterious effect on a carcass, and the flesh of an animal which had been so treated was simply unmarketable, for it did not bleed well, neither would it set well, and remained soft, dark, and flabby. It might be laid down as a general rule that such an animal should be allowed at least forty-eight hours to recover from this condition, and the meat should be given an additional forty-eight hours before it was cut up.

"Trampled" was the term applied to the condition of an animal which had "gone down" in a crowded wagon on the way to a sale, and was naturally most common amongst sheep. There was generally extensive bruising, and the animal was all but suffocated. Much depended on the length of the interval between the occurrence of the injury and arrival in the slaughter-house. All such carcasses should be hung for thirty-six hours until completely set, they should then be cut into butchers' cuts, and if the flesh was firm and clear it should be passed, and if otherwise, condemned. Dealing with parasites, Mr. McPhail said that the carcass of a pig suffering from measles presented a pale, flabby appearance, had a slimy feel, was soft, and dropsical. The bladders were only distinguished on a careful inspection of the muscles. They were about the size of a small pea, and were quite numerous in the muscles, liver, spleen, and under the tongue. The carcass should be condemned. This condition was fairly prevalent in England, and consequently it would be well to avoid "underdone" pork, that was, pork insufficiently cooked to destroy the parasites.

II.—"Accidental Beef."

Mr. McPhail then described sixteen forms of what he called "accidental beef," stating that this class claimed their special interest from the fact that the veterinary surgeon was as often called to see a dressed carcass as he was to see a live animal before being slaughtered for food. He placed "choking" first, not because it was the most common, but because the carcasses were a veritable trap to the veterinarian. Tympany set in very shortly after the act of choking, and owing to the enormous pressure of the gases, these were not only absorbed by the blood and conveyed into the flesh, but were also mechanically pressed into the tissues, where they remained, with the result that such meat decomposed with extraordinary rapidity. The general appearance of a "choked" carcass which had been properly bled and well dressed was quite calculated to deceive at first sight, but on being "ribbed" and cut up the extent of the damage was appreciated. The flesh was pale and slaty in colour, loaded with serosity, and having an odour of fermenting turnip or of intestinal gases. This odour was specially noticeable in the thighs and in the shoulder if an incision be made there. Such meat should be condemned, apart altogether from the interests of the consumer, owing to its liability to rapid decomposition. Carcasses of cows which had been slaughtered while suffering from milk fever might not show signs of alteration if the animal had been killed in the early stages of the disease, but if time was allowed to elapse before the animal was slaughtered the flesh was pale and soft; it did not "set," and was undoubtedly unfit for food. Stomach and digestive derangements were very common in the animals they had to deal with, and the changes in the flesh were mainly due to the tympany, which acted in the same way as in choking, and to the medicines which had been administered, thus communicating a tainted smell to the flesh, which was often the cause of the carcass being condemned. In grass disease and stomach staggers, when brain symptoms developed, there were very marked changes in the flesh, rendering it very dark, and preventing it "setting" properly, in which condition it must, of course, be condemned, but in the first stages the carcasses were generally passable. In constipation and impaction there was not much change observed, and the meat should be passed if the animals had been slaughtered in the early stages and the flesh was not tainted with volatile medicines.

Traumatic pericarditis was a fairly common condition, and was caused by the passage from the stomach into the chest of some foreign body which had been ingested, such as pieces of metal, pins, needles, knives, &c. One of the chief characteristics of this condition was the almost unbearable odour evolved when the chest was opened, and on examination a track was generally found which could be traced from the stomach to the pericardium. The carcass was always dropsical, and should be condemned. Speldring was caused by an accident, whereby animals in slipping had fallen and fractured their leg or legs. These animals were, as a rule, promptly killed and dressed. Such carcasses should hang for at least

forty-eight hours, then be cut up, the damaged portions being retained. The accident never seemed to affect the "setting" of the carcass. The carcasses of animals suffering from red water were pale and anæmic, soft and flabby, and did not "set," the flesh was loaded with serosity, the carcass was dropsical, and the kidneys were large, pale, and soft, and had very little fat about them. The flesh was unfit for food, and should be condemned.

Concerning the passing for condemnation of braxy mutton, Mr. McPhail said it could not be denied that enormous quantities of this were eaten in Great Britain, either pickled, smoked, or simply cooked after being dressed, and it had been stated that it did not do much harm. Still, he had known of serious consequences having resulted from the eating of such meat. It was most certainly very far beneath a market standard, and ought to be condemned. Pneumonia was also fairly common, and it varied in character. Seeing that a limited pneumonia produced no appreciable change in the beef, the carcass might be passed; yet an extensive pneumonia always produced changes caused directly both by the accompanying fever and by the interference with the æration of the blood. These carcasses were always soft, did not set, were very dark on section, and should be condemned. Pyæmia was the formation and the development of multiple abscesses in different parts of the body. The carcasses were pale, anæmic, and dropsical, and should be condemned. When cases of sore feet occurred the owner frequently lost patience and resolved to slaughter the animal. The conditions were generally local, and did not produce any systematic alterations sufficient to reflect on the carcass, which should be passed.

The meat of animals killed or injured by lightning shock was undoubtedly not up to a market standard, and consequently it should be condemned. It was a peculiar fact that in animals killed by electric shock the conditions were not nearly so aggravated as those in lightning shock.

Mammitis was very common, and sent more dairy cows to the slaughter-house than any other disease. It was a peculiar fact that very extensive disease might exist in the udder without any appreciable effect on the carcass, and consequently a hasty opinion on such carcasses should never be given. The carcass would "firm up" and "set well," and should be passed. But if gangrene of the udder was present, the accompanying fever would so alter the flesh as to leave no alternative but to condemn it. Septicæmia was a rapidly fatal disease, generally having its origin in parturient conditions, and the carcasses should unhesitatingly be condemned. With regard to the consumption of flesh of cows killed while in a parturient condition, Mr. McPhail said there were undoubtedly grounds for a difference of opinion, especially where an animal had not been allowed to exhaust itself, but had been killed in the early stages when it became evident that calving could not be accomplished. In such cases it was almost impossible to detect any alteration in the flesh, and if it was otherwise up to standard he would personally pass it. In cases of difficult calving the changes in the flesh were similar to those caused by fever. The flesh was pale in colour, did not set, and was very flabby; in addition, the gigots on section were found to be simply loaded with serosity. Such a carcass should be condemned.

An important feature of meat inspection was stripped flesh, which referred to the removal of the pleural and peritoneal lining from the walls of their respective cavities. This operation carried out in the chest might be perfectly *bonâ fide*, as a carcass might be stripped for what was called "oversticking." But "stripping" was generally performed for the purpose of removing traces of disease, and was commonly perpetrated in cases of tuberculosis of the pleura. Regarding the method by which the process was carried out, an incision was made along the under side of the diaphragm while the carcass was still warm, and with a cloth the edge of the pleura was raised up; the fingers were first inserted, then the whole hand, and the membrane was easily worked off and separated, the whole process taking only a minute for each side. This was followed up by a quantity of blood being rubbed into the parts stripped, when they were then faced up with a cloth, and some more blood was afterwards

sprinkled over and allowed to dry. Should the inspecting veterinary surgeon have the slightest suspicion that such a state of matters existed, a cloth should be dipped in very hot water and held for a minute on the ribs, and on its removal it would easily be seen if the pleura was intact, for if so, it would show up quite opaque; but if the part should have been stripped the connective tissue lining of the intercostal muscles will only be seen. Regarding the inspection of such flesh, Mr. McPhail said that even although the meat in their opinion be sound, yet they must not pass as "marketable" any stripped meat, because the Local Government Board had issued certain recommendations and instructions to their inspectors, and one of the most important was that they should seize all stripped meat. In conclusion, he urged them, as veterinary surgeons, to keep up as high a standard of good meat as was possible to attain, and advocate it in every way, and thus show the public that, for their own safety, they should appoint professional men to be the final judges as to whether meat was "diseased or unsound or unfit for the food of man."

Commenting on the foregoing paper, the *Scottish Farmer* says:—

The paper read by Mr. McPhail to the National Veterinary Association in August last is put before the reader to-day, and in its own line nothing more valuable has been presented for a long time. Those who read it carefully will learn much concerning the views of meat inspectors on what is, and what is not, wholesome food; and farmers who are unfortunate enough to become possessors of what he calls "accidental meat" will see how very narrow a margin is left for them to work on. Mr. McPhail's views may not be shared by all inspectors, but it is important to observe that he submits these views, not as his personal ideas, but as what he believes to be demanded by the requirements of the Local Government Board. If there are places where the regulations are not carried out so strictly as is demanded by Mr. McPhail, it should be remembered that, as far as can be seen, the inspectors in these places are coming short of their duty. In other words, if Mr. McPhail's views do not in every case coincide with what is, they represent what ought to be.

The net result of the argument of this exhaustive paper undoubtedly is that none but qualified veterinary surgeons should be appointed as meat inspectors. This is demanded alike by the interests of the public, which are paramount, and the interests of the farmer or butcher. The public are entitled to be protected against unsound meat, and they are also entitled to a guarantee that all meat that is sound should be put upon the market, so that there may be as large a supply of wholesome food as possible. The stockowner and butcher are entitled to be protected against the erratic decisions of men whose knowledge of meat is purely empirical, and in whose verdicts there is no consistency. Efficient meat inspectors are men who know disease and its effects on flesh that is offered for sale. A knowledge of disease may not always be possessed by the man who knows the appearance of flesh which is diseased, but clearly the knowledge of disease is the more important, for the greater includes the less. It is therefore a matter of great importance to stockowners and butchers that meat should be passed under review by men who know what they are doing, and have a professional reputation to preserve or lose.

Fault will fairly be found with the attitude which Mr. McPhail assumes towards foreign meat. He explains how that meat is inspected at the port of despatch, but the weakness of his view that that is sufficient is clearly seen when we read what he says about the instruction of the Local Government Board regarding "stripping." There is no guarantee in the case of foreign meat that it has not been "stripped and dressed," and, unless it be subjected to the warm fomentation test described in the paper, there never can be any certainty that the meat has not been efficiently "dressed." The home feeder and distributor is entitled to demand that his foreign rival should not enjoy immunities which are denied to him. If there is to be differentiation between home and foreign produce, the difference should be in our own favour. Unfortunately, experience shows that in respect of most things the reverse holds good, and there is reason to fear, from what Mr. McPhail tells us, that foreign meat is no exception to the rule. Such ought not so to be.

EXPERIMENTS IN VACCINATION AS A PREVENTIVE OF "TRISTEZA."

(Translated from the French by A. J. Boyd.)

At the sessions of 12th and 26th July, 1900, of the Central Society of Veterinary Medicine at Paris, Mons. Nocard said :—

The Society is not unaware that the study of the "Tristeza" was one of the principal objects of the campaign which Mons. Lignières has just carried out in Argentina. A pamphlet published at Buenos Ayres, illustrated by a large number of drawings or microscopic photographs, furnishes an excellent *résumé* of this study.

Mons. Lignières has shown that "Tristeza" is only an indication of bovine malaria, that universal disease which Smith and Kilborne were the first to describe so clearly under the name of "Texas fever," and which has been since found, under various names, in all countries of the world—except, perhaps, in France and in Central Europe.

The "Tristeza," like Texas fever, is caused by an endoglobular hæmatozoa, the *Piroplasma bigeminum;* like that fever, it communicates itself from diseased to healthy animals by inoculation, and the agent of inoculation is represented by young ticks, the progeny of mother ticks which have gorged themselves with the blood of diseased animals; the consequent mortality is considerable; it is very rare that adult beasts resist a first attack; but this first attack confers perfect immunity, enabling a beast to resist the most serious attacks of infection.

The symptoms are identical: high fever, intense hæmoglobinuria, the result of a probable corpuscular destruction; in from twenty-four to forty-eight hours the number of red corpuscules may fall from 8,000,000 to 500,000 per cubic millimetre. The blood collected during the course of the attack yields a serum which can only be compared to syrup of gooseberries, or, better still, to that of black currants. The same lesions are found on *post-mortem* examination; the spleen is enlarged, soft and black; the liver and kidneys are congested and softened; the gall bladder is enormous, filled with a thick, clotted bile; the bladder is distended by a large quantity of red urine like coffee grounds.

Mons. Lignière's *memoire* is replete with new facts concerning the etiology of the disease and the life history of the micro-organism. But what it omits to state—it has been published too soon—is that Mons. Lignières has succeeded in vaccinating against the "Tristeza"; before he left Buenos Ayres he gave a grand public demonstration, in the course of which several vaccinated animals were able to sustain, without discomfort, the inoculation of a dose of virulent blood which either killed all the control animals or made them seriously indisposed.

This experiment is considerably far-reaching; it is the first time that vaccination against a hæmatozoic disease has proved successful. Mons. Lignières is about to renew the experiment in my course at Alfort. Two Breton bulls are in process of immunisation; next Sunday they, together with a *fresh* bull of the same breed, will be inoculated with a fatal dose of virulent blood.

In a few days the control will exhibit the gravest symptoms of the disease; it will in all probability succumb; the two vaccinated ones will remain perfectly healthy. I invite those of our colleagues who are interested in the matter to watch this experiment; but, seeing that it is impossible to say just when it will be completed, I would ask the president to be good enough to nominate from amongst the members who live at the College, or in its neighbourhood, a commission to be charged with the duty of watching the experiment and of reporting on it at the next session.

The bulletin of the Society would thus promulgate the first fruits of the important discovery made by Mons. Lignières.

Report of the Commission Appointed by the Central Society of Veterinary Medicine.

Mons. Moussu said: Gentlemen, in the course of your last session Mons. Nocard explained to you briefly the importance of the investigations carried out in Argentina by our colleague, Mons. Lignières, on the disease known as the "Tristeza." (Texas fever, parasitic hæmoglobinuria of cattle, &c.) He has pointed out to you the serious losses amongst horned stock arising from this disease, and he has told you furthermore that, as a result of studies and of experiments carried on for more than a year, Mons. Lignières had succeeded in discovering a method of vaccination at once very simple in its application and absolutely efficacious.

It is not at all my intention to dwell again on the nature of the disease, which is caused by an intra-globular blood parasite, the *Piroplasma bigeminum;* but I wish to prove what a far-reaching scientific value and what great practical interest a discovery such as that of our colleague may possess, for, up to the present, not only had no one dreamt of vaccinations in similar diseases, but no one had even been able to arrive at the point of cultivating these micro-organisms.

Now, Mons. Lignières has solved the two problems. He has cultivated the *Piroplasma bigeminum*, and he has vaccinated subjects against the disease which this micro-organism determines.

A public experiment has already been made with complete success in Buenos Ayres. Mons. Lignières being desirous of multiplying the proofs of his statements, Mons. Nocard proposed that you nominate a commission to note the experiments made at the College of Alfort.

This commission was composed of Messrs. Nocard, Railliet, Mollerean, and your reporter. The inoculations were made in the presence of the commission on 15th July, 1900; the members kept the subjects of the experiments under observation, and I am here to-day to give you the results which were arrived at.

Five animals of the Breton breed were experimented on; two of these, the cows numbered 1 and 4, had been inoculated with the natural disease by Mons. Lignières on his return from Argentina. They had resisted the attack, after having shown the disease in a mild form, and might be regarded as immune. Two others, the cows numbered 2 and 3, had been vaccinated on 5th July without having exhibited any symptoms other than a slight rise of temperature (*hyperthermia*) of short duration.

Finally, the last, an adult Breton bull, which was intended to serve as a control, had not been subjected to any treatment.

The test inoculation was made on 15th July at 10 a.m.; each subject received a sub-cutaneous injection of 5 cubic centimetres of virulent blood. The following is what has happened since that date:—The two cows, Nos. 1 and 4, *recovered* from a first mild attack of the disease, did not indicate the least disturbance of their former general condition; the appetite was always excellent; the temperature was perfectly regular, as you will be able to judge from an examination of the thermic curves which I place before you.*

These two animals reacted in no way to the inoculation to which they were subjected.

The two cows, Nos. 2 and 3, *vaccinated*, behaved in a manner precisely similar to that of the preceding cows. The inoculation had apparently not the least effect on them. Their temperature was always regular and normal; the proof of this statement lies here in the thermic curves.

It may then be asserted that the vaccination was perfectly successful, since it did not even inconvenience the subjects of the experiment.

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* The plates showing the curves alluded to have not been reproduced, as they are not essential to a comprehension of the context.—Ed. *Q.A.J.*

As for the control, bull No. 5, he behaved in a totally different manner. From the 15th to the 20th all went well, and it would have been impossible, even on the evening of the 20th, to say that on the following day he would be found in a most alarming condition. During these five days the temperature was perfectly regular between 38 degrees C. and 39 degrees C. (101 degrees Fahr. and 103 degrees Fahr.); food and drink were taken with a good appetite.

Suddenly, during the night of 20th to 21st July, the temperature rose from 38·3 degrees C. to 40·4 degrees C. (101 degrees Fahr. to 105 degrees Fahr.). The appetite almost entirely ceased, but, notwithstanding this violent reaction, the animal remained strong and sprightly, and the urine was still of the normal colour.

On the 22nd the temperature rose to 40·7 degrees C. (105·6 degrees Fahr.), food was utterly refused, the sick beast was more depressed, the urine appeared slightly coloured, but as yet only few hæmatozoa were found in the blood.

On the 23rd the temperature rose to 41·2 degrees C. (106 degrees Fahr.). The depression was extreme. All nourishment was absolutely refused the urine was of a pronounced red colour, and passed rapidly to brown when exposed to the atmosphere. The examination of the blood revealed the presence of a large number of piriform hæmatozoa. The enumeration of the red corpuscules, which was performed by Mons. Nocard at 2·30 p.m., showed only 3,000,000, that is to say, less than half the normal number. At 6·30 p.m. there were only 1,000,000.

I fully expected, from what I had already seen, that the patient would die during the night. In the course of May and June, Mons. Lignières had inoculated two sick beasts for my use, and I had seen them die of high fever (*hyperthermia*) and with symptoms so similar to those exhibited by our control that I predicted a *post-mortem* for the following morning.

Contrary to all expectation, on the morning of the 24th, the general condition appeared to be stationary. The animal still refused food, it appeared greatly constipated, the muzzle remained very dry, the urine was of a still darker colour than on the previous evening, of the colour of black-currant juice, and an enumeration of the red corpuscules only showed 370,000 per cubic millimetre.

Only a few micro-organisms were now found in the blood, and these were of rounded shape, no longer piriform.

On the other hand, the temperature underwent a sudden fall of almost 3 degrees C. (25 degrees Fahr.). From 41·2 degrees C. (106 degrees Fahr.) it fell to 38·3 degrees C. (101·4 degrees Fahr.).

Mons. Lignières anticipates a favourable termination following a very virulent attack of the disease. This is what appears in reality to be the case.

Yesterday evening the patient took some drink. This morning, 25th July, a perceptible and clearly evident improvement showed itself. The temperature remains low, 38·4 degrees C. (101·4 degrees Fahr.); the muzzle is almost cool; the patient drinks willingly, and tries to eat a little. A favourable termination is therefore probable.

Now, gentlemen, the disease caused by the piroplasma, whilst often causing great ravages in Argentina, is not fatally mortal. It is not, therefore, an exceptional case that our control survives.

That which must be remembered in the experiment which I have just reported is that, without the least doubt, the vaccination as practised by Mons. Lignières has been shown to be absolutely efficacious. The two subjects vaccinated were not even inconvenienced in the slightest degree, whilst the control was so sick that it might have been considered as lost.

The demonstration appears then to be perfect, and, from a practical standpoint, no more are required.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1900.				1901.								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
North.													
Bowen	0·12	0·31	0·05	2·30	17·25	6·23	8·26	4·75	0·94	0·19	0·10	6·36	0·18
Cairns	2·44	1·52	1·61	4·19	11·53	22·09	14·93	8·87	13·18	0·57	0·89	2·53	1·82
Geraldton	2·63	3·17	2·39	18·68	23·32	32·93	37·64	26·10	26·72	1·21	2·58	11·77	3·37
Herberton	0·74	Nil.	3·11	4·01	8·25	4·16	10·95	2·87	3·80	0·18	0·64	2·53	1·04
Hughenden	0·14	Nil.	0·10	0·61	1·62	1·41	2·82	1·74	3·48	0·03	Nil.	0·33	Nil.
Kamerunga	1·42	1·98	1·28	2·38	15·91	22·36	13·09	9·57	13·18	2·09	2·60	1·94	1·72
Longreach	Nil.	Nil.	0·19	0·11	0·41	0·22	3·09	2·56	5·95	0·09	Nil.	0·37	0·58
Lucinda	0·44	1·33	0·88	2·48	31·80	24·76	15·78	9·16	8·63	2·89	2·17	5·89	0·30
Mackay	1·19	0·48	0·12	7·00	24·85	8·99	10·13	6·80	1·32	0·25	1·07	5·14	2·29
Rockhampton	2·52	0·53	1·15	0·68	0·49	8·26	5·53	2·84	0·79	0·24	2·29	3·04	1·78
Townsville	0·25	0·91	0·05	0·76	14·91	12·94	4·95	3·13	0·74	0·32	0·19	1·87	0·14
South.													
Barcaldine	0·03	Nil.	0·30	1·20	0·15	1·17	3·70	1·90	2·21	0·82	0·63	0·25	0·51
Beenleigh	1·90	0·26	2·80	1·49	5·99	4·30	11·44	4·17	4·55	4·15	1·34	4·49	0·70
Biggenden	3·07	0·87	1·65	0·06	1·11	2·55	6·19	6·35	1·47	1·60	0·74	2·81	2·11
Blackall	0·12	Nil.	0·29	0·17	0·29	0·90	2·28	3·96	3·80	0·90	0·55	0·44	0·88
Brisbane	1·52	0·14	2·48	0·55	3·43	2·96	11·70	3·10	2·29	3·29	1·31	3·71	1·30
Bundaberg	1·56	3·05	1·06	1·28	2·34	2·61	3·17	10·27	1·14	0·74	2·01	5·59	1·80
Caboolture	2·94	1·99	0·86	2·11	1·11	5·51	11·53	4·64	3·34	2·27	3·70	3·48	1·55
Charleville	0·59	0·13	0·19	1·13	0·19	0·22	1·10	2·61	3·28	0·93	1·27	0·92	0·32
Dalby	1·67	Nil.	1·77	3·37	2·89	0·44	4·77	3·12	1·12	3·59	2·83	1·66	1·11
Emerald	0·35	0·18	0·31	1·08	3·65	4·43	3·25	0·88	1·31	0·63	0·90	1·74	1·11
Esk	3·00	Nil.	1·35	1·80	3·99	3·15	8·36	4·11	1·78	2·45	3·01	3·03	1·72
Gatton College ...	2·81	Nil.	4·12	0·47	6·27	1·54	6·73	3·86	1·55	2·93	1·53	3·23	1·06
Gayndah	3·28	3·21	1·84	0·08	1·22	2·10	4·22	3·97	0·97	2·32	2·29	Nil.	1·91
Gindie	0·22	0·27	0·49	1·32	1·57	1·62	2·07	0·44	1·21	0·84	1·34	1·77	1·81
Goondiwindi	2·14	0·26	0·90	0·94	0·59	0·25	3·53	1·82	1·90	1·73	2·30	1·55	0·67
Gympie	5·67	0·18	0·84	0·47	2·57	3·10	18·56	3·89	3·38	2·82	3·40	3·39	1·34
Ipswich	1·37	0·01	3·93	0·47	2·09	2·88	7·01	3·38	1·43	3·16	0·97	2·47	3·54
Laidley	3·39	Nil.	4·55	0·63	4·01	1·58	6·94	3·81	1·47	2·54	2·00	5·32	1·22
Maryborough	3·55	1·22	0·68	1·18	5·03	5·51	11·76	5·58	4·09	2·22	3 07	5·02	1·05
Nambour	4·15	0·52	1·91	2·19	4·25	9·13	18·01	3·33	7·25	3·33	6·80	4·42	0·98
Nerang	2·79	0·26	3·02	2·92	4·26	4·22	14·91	5·12	5·42	5·34	0·79	5·41	0·88
Roma	0·77	0·66	2·20	3·28	1·13	0·11	1·77	1·11	1·11	2·66	2·26	0·98	0·43
Stanthorpe	3·98	0·23	2·17	2·16	1·94	0·80	3·95	2·13	0·77	2·74	1·52	4·22	1·42
Taroom	2·26	1·47	0·45	0·29	1·40	0·10	3·15	1·88	1·70	2·19	2·74	2·34	2·11
Tambo	0·19	Nil.	1·87	1·52	0·52	0·51	1·66	2·75	2·85	1·47	0·73	0·74	1·47
Tewantin	5·78	1·48	0·74	0·95	7·04	14·18	20·33	11·70	12·20	5·45	8·34	4·61	2·71
Texas	2·68	0·35	2·67	3·33	1·29	1·35	4·58	1·46	1·10	1·87	1·00	3·06	1·47
Toowoomba	1·95	0·43	2·42	2·40	3·60	1·76	6·84	6·59	1·04	3·57	2·22	5·57	1·85
Warwick	2·72	0·13	2·01	2·50	2·90	0·26	5·56	2·91	0·82	3·47	1·57	5·74	2·05
Westbrook	0·60	0·04	4·59	1·35	1·88	0·73	4·37	3·38	0·74	3·48	1·64	6·50	1·75

CLEMENT L. WRAGGE,
Government Meteorologist.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER (duty free).—Australian, 92s. to 104s.; Danish, 114s. to 116s.; Canadian, 104s. to 106s.

CHEESE (duty free).—American, 46s. to 48s.; Canadian, 47s. to 48s.; New Zealand, 43s. to 48s.; Australian, 38s. to 48s. per cwt.

SUGAR (duties, raw, 2s. to 3s. 10d.; refined, 4s. 2d. and ¼ per cent.).—Refined, £17 10s. to £19 10s. per ton; German beet, 88 per cent., 7s. 7½d. per cwt.

SYRUPS (duty, 2s. per cwt. and ¼ per cent.).—Finest, 17s. per cwt.

MOLASSES (duty, 2s. per cwt. and ¼ per cent.).—6s. to 8s. 6d. per cwt.

RICE (duty free).—Rangoon, £9 to £16; Japan, £14 to £22; Java, £21 to £26; Patna, £20 to £24 per ton; Queensland (Pimpama Island), valued at £18 10s. in the London market. Sales of Queensland seed rice, 6s. per bushel.

COFFEE (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, small to good middling, 46s. to 54s.; good to finest, 92s. to 120s.; peaberry, 48s.; Santos, 27s. to 32s.; Mocha, 68s. to 80s.; Jamaica, finest, 90s. to 106s. per cwt.

ARROWROOT.—St. Vincent, 1d. to 4d.; Natal, 5½d. to 7½d.; Bermuda, 1s. 5d. to 1s. 8d. per lb.

WHEAT.—Australian, white, 29s. to 29s. 6d.; New Zealand, white, 29s. 3d. to 30s.; Duluth, red, 32s. 3d.; Manitoba, red, 32s. 6d.

FLOUR.—Australian, 18s. to 20s. 6d. per 280 lb.

MALTING BARLEY.—English, 26s. 6d. to 27s. 6d. to 32s.; Californian, 26s. to 27s.; New Zealand, 25s. to 30s. per 448 lb.

OATS.—New Zealand, 26s. to 26s. 6d. per 384 lb.; Canadian, 17s. 3d. to 17s. 9d. per 320 lb.

SPLIT PEAS.—40s. to 50s. per 504 lb.

GINGER (duty free).—Calicut, good medium, 80s. to 95s.; medium, cut rough, 50s. to 70s.; small, cut rough, 30s. to 34s.; Japan, rough, 32s. to 33s.; Jamaica, good bright, 60s.; middling to fair, 40s. to 47s. per cwt.

PEPPER.—Capsicums, 15s. to 80s.; chillies, 35s. to 50s. per cwt.

TOBACCO.—The Texas crop has been sold at 6d. per lb. About 6 tons grown on the State Tobacco Farm at Texas has been sold at an average of 7½d. per lb. Messrs. H. Edwards and Co., Liverpool, report as follows:—Kentucky leaf, 4d. to 6d.; Burley, 6d. to 8d.; Virginia (dark), 3½d. to 5½d.: Virginia (bright), 4d. to 1s. 3d. Messrs. Pringle Bros., London, quote cigar tobacco as follows:—Manilla, 3d. to 4s.; Havanah, 4d. to 5s.; Yarra and Cuba, 5d. to 2s. Stocks on hand, 30th June: Leaf, 18,680 hogsheads; strips, 73,416 hogsheads; or 95,000,000 lb.

WINE.—Prices remain as quoted last month.

GREEN FRUIT.—Apples, Australian, 8s. to 15s. per case; pineapples, 3s. to 5s. each; oranges, common, 15s. to 17s.; medium, 17s. 6d. to 18s.; fine, 22s. to 24s.; finest selected, 25s. to 32s. per 420; lemons, finest selected, 13s. per case; bananas, 9s. to 13s. per bunch.

COTTON.—Clean upland, 5½d. per lb.

COTTON SEED.—£7 per ton.

COTTON-SEED OIL CAKE (decorticated).—£6 2s. 6d. to £6 10s. per ton.

COTTON-SEED OIL.—Crude, £22 10s. to £22 15s. per ton.

LINSEED.—£6 per qr.

LINSEED OIL.—£31 5s. to £31 12s. 6d. per ton.

OLIVE OIL.—£35 per tun.

EATING OIL.—£50 per tun.

LINSEED OIL CAKE.—£8 5s. to £8 7s. 6d. per ton.

MANILA HEMP.—£25 to £30 per ton.

NEW ZEALAND HEMP.—£30 10s. per ton.

EGGS.—French, 7s. 3d. to 10s.; Italian, 7s. 9d. to 9s.; Austrian, 6s. 3d. to 7s. per 120.

WOOL.—The London market is firm, and prices may be expected to remain at present rates.

FROZEN MEAT.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

New Zealand Mutton.

(Crossbred Wethers and Merino Ewes.)

	Oct. 12.	Oct. 19.
Canterbury	$3\frac{7}{8}$d.	$3\frac{13}{16}$d.
Dunedin and Southland	$3\frac{5}{8}$d.	$3\frac{9}{16}$d.
North Island	$3\frac{3}{8}$d.	$3\frac{5}{16}$d.

Australian Mutton.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	$3\frac{1}{16}$d.	$2\frac{15}{16}$d.
Light (under 50 lb.)	$3\frac{1}{16}$d.	$2\frac{15}{16}$d.

River Plate Mutton.

(Crossbred and Merino Wethers.)

Heavy	$3\frac{1}{4}$d.	$3\frac{1}{4}$d.
Light	$3\frac{1}{4}$d.	$3\frac{1}{4}$d.

New Zealand Lambs.

Prime Canterbury (32 lb. to 42 lb.)	$4\frac{3}{8}$d.	$4\frac{3}{8}$d.
Fair average	$4\frac{1}{4}$d.	$4\frac{1}{4}$d.

Australian Lambs.

Prime (32 lb. to 40 lb.)	—	—
Fair average	—	—

New Zealand Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	$2\frac{5}{8}$d.	$2\frac{5}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	$3\frac{7}{8}$d.	$3\frac{7}{8}$d.

Australian Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	$2\frac{5}{16}$d.	$2\frac{1}{4}$d.
Ox, hinds (180 lb. to 200 lb.) ...	$3\frac{1}{4}$d.	$3\frac{3}{16}$d.

These prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotation is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

BACON.—Irish, 64s. to 70s.; American, 47s. to 50s.; Canadian, 56s. to 59s. per cwt.

HAMS.—Irish, 96s. to 100s.; American, 45s. to 60s. per cwt.

HIDES.—In fair demand at last quotations.

TALLOW.—There has been a considerable rise in the price of tallow. Beef, fine, £32 15s.; medium, 29s. 6d.; mutton, fine, £33 15s.; medium, 30s. per ton.

Agricultural Patents.

PATENTS ACCEPTED.

Churn or Egg-Beater.—Class 32 (2 Figures)—5974: David Murray, of Farquhar street, Wingham, New South Wales, Australia, blacksmith. "An Improved Domestic Agitator for Churning and the like." Dated 24th April, 1901. (Drawings, 10s.; specification, 4s.) A cylindrical vessel, with a liquid-tight cover at one end, is gripped by a wrought-iron belt-clamp near its middle; the belt-clamp has gudgeons and a handle at one end whereby the vessel may be repeatedly overturned end for end by rotation in a portable frame that may be screwed or clamped to a table. (2 claims.)

Plant Poison.—Class 28—6009: Alfred Martin, of Forest Lodge, near Sydney, New South Wales, machinist. "A Solution for Destroying Prickly Pear and other Noxious Plants." Dated 13th May, 1901. (No drawings; specification, 2s. 6d.) A solution made with 3 to 4 lb. each of caustic soda and washing soda, with ¼ to ½ lb. of alum, in a gallon of water, is sprayed or injected on the plants, which should be previously chopped down. (1 claim.)

Sheep-shearing Machine; Balanced Cutter Pressure.—Class 36 (13 Figures)—5998: John Kerwin Stewart, of No. 158 East Huron street, Chicago, Cook County, Illinois, U.S.A. "Improvement in the Construction of Clippers for Shearing Tools." Dated 7th May, 1901. (Drawings, 10s.; specification, 17s.) To obtain equality of pressure on the three fingers of the upper cutting comb, notwithstanding its flexibility and other irregularities, the pressure of the floating forked lever upon the two outer fingers is given by a screw which reacts on the main rocking-bar to which the central lever is attached, so that the total pressure is suitably divided, and all other elasticity is avoided in the action; a laterally rockable pivot for the floating lever causes equal division of pressure on the outer fingers. (7 claims.)

Dropper-clip Tongs.—Class 35 (8 Figures): This portable lever tongs kinks the horizontal and vertical wires of a fence together at one operation, and compresses around the joint a previously prepared sheet-metal clip (described in No. 4975). One handle of the tongs is formed integrally with the jaw supporting the horizontal wire from the back, parallel to which is a jaw bolted to the front part. The opposing jaw slides between these on guide-bolts, and is spring-retracted, and is projected by the cam-shaped end of the second handle of the tongs. The partly bent prepared clip is placed with the wires in the gap and is closed by one action of the levers simultaneously with the kinking of the wires. (5 claims.)

Grip-dogs for Wire-straining.—Class 35 (3 Figures)—5993: Francis Temple Page, of Pahiatua, New Zealand, farmer. "An improved Grip to be used in conjunction with Wire-straining Appliances and for other analogous purposes." Dated 4th May, 1901. (Drawings, 7s. 6d.; specification, 5s. 6d.) Two elongated pieces of sheet metal are twisted and provided with hooked slits which may be locked together with the wire gripped between both hooks; a spring double hook or link applies traction to holes in the outer corners of the pieces of sheet metal so that the greater the traction the greater the compression of the dogs on the wire. The dogs may be used in connection with the straining lever in specification 5724. (2 claims.)

FLUID SPRAYER; RESERVOIRS; FOOT VALVE.—Classes 45, 69, 70, 80, 81, 82 (5 Figures)—5994: Franklin George Benson, of Cheltenham street, Malvern, South Australia, engineer. "Improvements in Sprayers for Perfume, Antiseptics, and the like." Dated 4th May, 1901. (Drawings, 10s.; specification, 7s. 6d.) Two cylindrical reservoirs are connected by a screw regulating valve; in one air is compressed by a single-acting air-pump with a foot valve formed of a rubber-covered elastic metal plate; the other cylinder, in which the perfume or other liquid is stored, has atomizing or spraying jets of customary type. By the use of the regulating valve between the cylinders, a store of compressed air may be utilised in small instalments as required without the need of operating the pump continually. (5 claims.)

STERILISING BEVERAGES UNDER PRESSURE.—Classes 32, 33 (2 Figures): —Wine, beer, milk, &c., are sterilised by rapid heating and cooling under pressure. A pair of rotating horizontal cylinders have jackets and interior circulating pipes, and all surfaces coming in contact with the beverage are silver plated. The lower cylinder is much smaller, and is charged with compressed CO_2, or compressed and sterilised air under a pressure of ten atmospheres. The larger upper cylinder is charged with the beverage, and while the cylinders are rotating (to promote convection of heat) steam is circulated in both vessels to raise the temperature rapidly to the sterilising point; the overflow of liquid (under heat expansion) passes by a suitable valve from the larger to the smaller vessel, and is there retained for subsequent treatment; the beverage is now rapidly cooled by the circulation of a cooling medium in place of the steam. Special arrangements of joints and valves is illustrated to permit rotation during the operations. (3 claims.)

COMBINED CANISTER LID AND PATTY-PAN.—Classes 13, 31, 76 (2 Figures) —5981: Joseph Robert Hayward, of 171 Peterborough street, Christchurch, New Zealand, pickle manufacturer. "An Improved Combined Receptacle-cover and Cooking Utensil." Dated 27th April, 1901. (Drawings, 5s.; specification, 1s. 6d.) The detachable lids of canisters for storing domestic articles are ornamentally recessed or embossed so that they may be used as a mould for confectionery, or other culinary purpose. (2 claims.)

WEEDS.

One of the most prolific writers on agricultural subjects in America, Professor L. H. Bailey, in a dissertation on weeds, advises farmers and gardeners not to be satisfied merely with the eradication of weeds, but to get at the reason why they exist and then to remove the cause. For instance, a farmer finds that some weed is "running out" his grass, and he wants to know how to eradicate it. Suppose he finds out how to do it, and does eradicate the weeds, still he has not gone far enough. He must go further and discover that his soil is worn out, impoverished, the grass thin and weak. In such a case it would be a queer sort of weed that did not jump at the chance and grow there. Enrich the soil, farmer, and study how to grow hay. In summing up, the professor gives six hints on checking weeds:—

1. Rotation in crops prevents weeds from gaining a foothold.
2. Frequent tillage prevents weeds getting a foothold. Land should not be left fallow without frequent harrowing.
3. Clean land after harvest.
4. Use clean seed, especially in untilled crops.
5. Do not allow weeds to go to seed on manure heaps, or use manure containing seeds.
6. Get your neighbour to keep his farm as clean as you do yours.

General Notes.

PICKLES AND PICKLING.

Pickling is a branch of domestic economy which embraces a great variety of articles.

It is a great convenience to the careful housewife to have them stored before winter sets in, and if properly made are much better for keeping.

Stone jars preserve the pickles best, and should always be used for those which require to be pickled with boiling vinegar. Those with cold vinegar may be put into glass jars or bottles, and kept in a dry, cool place.

Glazed earthenware ought never to be employed, as the coating, when corroded by the acid, renders the pickles not only disagreeable, but most unwholesome. Many cooks use copper and brass utensils for pickling, to give the vegetables a good colour, but it is an unwise custom. Their object can easily be obtained by following these instructions.

Have the vinegar at the proper degree of heat before pouring it over the vegetables.

Use only sound jars, which must be never more than three-parts filled with the vegetables, so that they will be well covered with vinegar.

The best and strongest vinegar is the cheapest in the end. Never allow it to boil; let it be well heated, as the essence of vinegar is lost in evaporation.

Use a wooden spoon in taking them in and out of jars, and great care must be taken in handling them too much after salting.

Walnuts, nasturtiums, gherkins, cauliflowers, broccoli, radishes, and beans should be dropped into boiling brine for a few minutes in the proportion of a handful of salt to 1 gallon of water. Take them out, and allow them to get quite dry and cold before putting into pickle.

The following spices are used for ordinary pickles :—Black whole pepper, long pepper, Jamacia peppercorns, ginger. Two ounces of the above spices mixed with a few chillies or cayenne pods, $\frac{1}{4}$ lb. of coarse sugar, and a good pinch of salt, is enough to flavour 1 gallon of vinegar.

GHERKINS OR CUCUMBERS.

In choosing these for pickling, let them be as smooth and free from spots as possible. Leave them in strong salt and water for a week, or until they become yellow, stirring them every day. When they are yellow pour off the water, and spread vine leaves over them.

Boil the water in which they were steeped, and pour it over the cucumbers. Let them soak thus until the water is nearly cold, then boil it again, repeating the process three or four times, taking care that the gherkins or cucumbers are well covered with the vine leaves.

Keep a dish and cloth over the top of the pan, so as to keep in the steam; this will make them a good colour.

When ready put them upon a hair sieve to drain.

The pickle is made by adding to every 2 quarts of white wine vinegar $\frac{1}{2}$ oz. of mace, 10 cloves, 1 oz. of white ginger, 1 oz. of white whole pepper, 1 oz. of lump sugar, a lump of alum (the size of a hazel nut), and a little salt. Let this simmer gently, and pour over the cucumbers while it is hot. When cold cover with bladder, and tie down tightly over the jar.

French beans, nasturtium, and other small green vegetables may be pickled in the same manner.

Be careful that the vegetables are fresh and young, and, if possible, gather them in dry weather.

When it is possible to obtain vine leaves, infuse them in the pickle; they impart such a beautiful colour.

RED PICKLED CABBAGE.

Cut the cabbage into slices on a chopping board. Set it upon a dish in layers with a sprinkling of salt over each layer. Let it stand for one night, then put it into a stone jar. To every 4 quarts of vinegar add 1 oz. of sugar and 2 oz. of mixed spice; heat this mixture almost to boiling point, and when cold pour over the cabbage, which must be well covered by the liquor.

It is fit to be eaten in seven days, although it improves with keeping, and should be of a lovely colour.

CURE FOR EARACHE.

Children are often liable to a severe attack of earache, and the remedy usually applied is hot oil. Try the hot middle of a boiled onion or place ground black pepper in a small piece of cotton-wool so wrapped up that the pepper cannot touch the ear. This will often effect a cure where hot oil fails.

TO GET RID OF ANTS.

Sprinkle the pantry and safe shelves with oil of penny-royal. The ants will in all probability disappear, but Australian ants are so pertinacious that the remedy must be applied at frequent intervals.

AID TO FRUITGROWERS IN THE UNITED STATES OF AMERICA.

A despatch dated 15th September, 1901, has been received at the Foreign Office from the British Embassy at Newport, R. I., reporting that under the appropriation made in the last session of Congress to assist investigation by the Pomological Bureau, the Secretary of Agriculture is making an arrangement by which the Government enters into co-operation with dealers and exporters whereby a minimum net return per package is guaranteed on all fruit shipped and sold under the direction of the Pomological Department. Under this arrangement the exporter would receive the net proceeds of the sales—that is, all proceeds after deducting freight and other charges. If this net return is less than the guaranteed amount, the difference between the net proceeds actually realised and the guaranteed return would be paid out of the money appropriated for pomological investigations.—*Board of Trade Journal.*

PROFITS ON THE FACTORY SYSTEM.

A correspondent of a southern exchange writes:—I recently received a copy of the balance-sheet issued by a Victorian factory for the year ending 31st May, 1901. The benefits accruing are graphically shown by the result of the year's operations. After paying a dividend on the paid-up capital at the rate of 7 per cent., the profits of the year allowed of a further distribution to qualified suppliers of a bonus of $\frac{5}{8}$d. per lb. on butter as per test. In this manner a further sum of £3,594 13s. 2d. was distributed amongst the lucky suppliers of this factory. I am also indebted to Mr. R. Crowe, the Victorian Government Dairy Expert, for particulars of the marvellous results achieved by another factory for the year ending 30th June, 1901. In this case, after paying a dividend of 7 per cent. on all paid-up capital, a bonus was given the suppliers of £4,478. In both instances a sum of over £1,000 was written off buildings and plant for the year. An extract from Mr. Crowe's letter will show what co-operation and modern dairying is doing for the Victorian farmer: "I have no copies to spare of Camperdown, Glenormiston, Warrnambool, Grassmere, Farnham, &c.; they all show a profit of cent. per cent. and upwards on the capital invested by the dairy farmers for the past year."

WEEDS IN GARDEN WALKS.

A weak solution of carbolic acid applied with a watering-pot to garden walks will effectually prevent growth of weeds. The solution should not be stronger than one part pure carbolic acid to 1,000 to 2,000 of water. Pure carbolic acid is a virulent poison. In a stronger solution larger plants might suffer. Very weak solutions only destroy small plants. Even flies and mosquitoes avoid its odour, and may be driven away.

CURE FOR SNAKE BITE.

We have heard of several infallible cures for snake bite, but many of them are only infallible from the inventor's point of view. Now, a Dr. Speissiger has submitted the following prescription which appeared in a Carolina (U.S.A.) Gazette so far back as 1749. It was discovered by a negro slave, and is said to be infallible. As a reward for his discovery he was given his freedom and a pension for life.

Take the roots of plantain or horehound (in summer roots and branches together) a sufficient quantity; bruise them in a mortar, squeeze out the juice, of which give as soon as possible one large spoonful. If the person is swelling, it must be forced down the throat. This generally will cure. If the patient finds no relief in an hour after, give another spoonful, which never fails. If the roots are dried, they must be moistened with a little water.

To the wound may be applied a leaf of good tobacco, moistened with rum. The plantain and horehound roots are easily procured in Queensland. Happily deaths from snake bite are rare in this State, but it is well to know of even a possible cure. Some districts of Queensland are infested by deaf adders. Residents in such places should take note of any possible cure, as the strychnine cure may not be always available.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

DEYEUXIA FORSTERI.

C. Clarke, Helidon.—The grass you sent for identification is thus described by Mr. F. M. Bailey, Government Botanist:—*Deyeuxia Forsteri*, Kunth.—This is a quick-growing grass, springing up with the slightest shower of rain, especially during winter, but at the approach of summer its light panicles break off and are seen blown about in all directions. One or other of its several forms may be met with throughout Southern Australia and New Zealand. Useful on account of giving a bite of feed in winter and early spring.

[Your letter was addressed to the Agricultural College instead of to the Department of Agriculture; hence the delay in replying.—Ed. *Q.A.J.*]

COMMERCIAL BUTTER.

In the September issue of the *Journal*, Mr. H. H. Seaborn, Beaudesert, asked which of two cows would give the greater amount of *commercial* butter fat, which we took to mean "commercial butter," there being no such thing as "commercial butter fat." By some remarkable error the answer was given that one of the cows would yield $\frac{3}{4}$ lb. more than the other. This was an obvious misprint, as the quantities of milk together would not yield so much. The correct answer should have been, as worked out by the dairy expert to the Department of Agriculture and by Mr. R. E. Davenport, of Mudgeeraba, $\frac{1}{125}$ lb. in favour of No. 1 cow.

OATS AS ENSILAGE.

W. H. Dyball, Greenbank, Yandaran.—I have a quantity of oats, and I should be glad if you would, in the next issue of the *Journal*, reply to the following questions on converting it into stock ensilage:—

Question 1.—At what stage should the oat crop be cut?

Answer 1.—Oats cannot be cut too green for the ensilage stack, provided the crop has reached the *earing stage.*

Question 2.—Should it be carted at once, or left on the ground for a while?

Answer 2.—It should be carted at once.

Question 3.—How much should be put on the stack each day?

Answer 3.—About 10 feet a day. Then stop operations for a day to allow the forage to settle down.

Question 4.—If wet with rain, can it be stacked?

Answer 4.—Yes. If you have a quantity cut, stack it quickly regardless of weather.

Question 5.—What is the smallest stack advisable to ensure good ensilage?

Answer 5.—A square stack 10 feet by 10 feet, holding 20 tons, is small enough. The smaller the stack, the greater the waste at the sides.

Question 6.—What pressure is needed, and how is it to be applied?

Answer 6.—No pressure is required. Experiments have proved that all the complicated screwing down appliances are needless.

Question 7.—Would the stack require any cover?

Answer 7.—Yes. Cover the stack with straw or any other available material. Stretch a couple of wires over it to keep it in place, and weight with a few stones to keep it from being blown off in a gale.

A stack 14 feet by 14 feet will contain 100 tons. One ton of green oats will make 1 ton of ensilage. One cubic foot of ensilage weighs on an average 45 lb.

The Markets.

AVERAGE TOP PRICES FOR SEPTEMBER.

Article.		SEPTEMBER. Top Prices.
		£ s. d.
Bacon	lb.	0 0 7½
Bran	ton	4 8 0
Butter, First	lb.	0 0 10
Butter, Second	"	0 0 7⅗
Chaff, Mixed	ton	3 15 0
Chaff, Oaten	"	5 14 0
Chaff, Lucerne	"	3 9 0
Chaff, Wheaten	"	3 9 0
Cheese	lb.	0 0 6⅕
Flour	ton	7 19 0
Hay, Oaten	"	5 14 0
Hay, Lucerne	"	2 7 0
Honey	lb.	0 0 2
Rice, Japan (Bond)	ton	17 12 0
Maize	bush.	0 2 8$\frac{1}{10}$
Oats	"	0 3 1
Pollard	ton	4 10 6
Potatoes	"	7 16 0
Potatoes, Sweet	"	2 10 0
Pumpkins	"	1 12 6
Sugar, White	"	17 4 0
Sugar, Yellow	"	16 10 0
Sugar, Ration	"	12 18 0
Wheat	bush.	0 3 8⅗
Onions	cwt.	0 16 2⅖
Hams	lb.	0 0 9
Eggs	doz.	0 0 6⅖
Fowls	pair	0 4 5⅖
Geese	"	0 6 1⅕
Ducks, English	"	0 4 10⅗
Ducks, Muscovy	"	0 5 6
Turkeys, Hens	"	0 7 2⅖
Turkeys, Gobblers	"	0 15 0

ENOGGERA SALES.

Article.	SEPTEMBER. Top Prices.
	£ s. d.
Bullocks	9 0 0
Cows	6 10 6
Wethers, Merino	0 15 8
Ewes, Merino	0 12 11½
Wethers, C.B.	0 15 3
Ewes, C.B.	0 13 10
Lambs	0 13 6
Porkers	1 10 0
Slips	0 17 10½

Orchard Notes for November.

By ALBERT H. BENSON.

The earliest varieties of Summer fruits will be ready to market during November; and as this is the beginning of the season, I beg to call the special attention of every fruitgrower in the colony to the importance of gathering and destroying all fly-infested fruits now if he wants to save any crop at all, as the neglect to destroy the first crop of flies will result in the loss of the succeeding crops of fruit. It is impossible to over-estimate the importance of destroying the early crops of fruit flies, as if left alone they breed so rapidly that the fruit crop is soon infested and destroyed.

The best way of destroying the first crops of flies is to gather and boil all infected fruit; such fruit, when boiled, to be fed to pigs or other animals. Feeding the fruit without boiling will result in the escape of a number of the maggots, and is therefore undesirable, besides being contrary to the Regulations of the Diseases in Plants Act.

Every fruitgrower should make it his business to see that his orchard is kept free from this pest, and not only his own orchard, but that his neighbours keep their trees free as well. All useless trees, such as inferior seedling peaches, guavas, &c., growing by hedge or fence sides, should be destroyed, as the fruit is valueless, and only becomes a harbour and breeding-ground for the fly. Unless fruitgrowers take action—combined and systematic action—to deal with this pest, it will never be kept in check; and for such action to be effective it is best to destroy all trees that produce unsaleable fruit, and to concentrate one's energies in keeping such trees clean that produce fruit of such a quality that it will command a ready sale. The marketing of fruit is a matter also that requires much more care and attention than is usually bestowed upon it. In many instances really good fruit is completely spoilt by carelessness in gathering, handling, and marketing, and is consequently valueless; whereas had it been carefully gathered, properly graded for size and ripeness, and packed in such a manner that it will carry well without bruising, and when opened up show to best advantage, it would have realised a satisfactory price. First-class fruit always pays to be well handled and well packed, as for such fruit there is always a good demand; but for badly handled, undersized, and bruised fruit there is little if any demand—at any rate, at remunerative prices. First-class early peaches, such as the Alexander or Brigg's Red May, grown on the Downs, would pay to be carefully wrapped in tissue paper and packed in trays holding one layer of fruit, as, if marketed in such a manner, they could be placed on the Brisbane market in first-class condition, and would realise good prices. First-class apricots, such as the Moorpark, would also pay to be handled in the same manner. Fruitgrowers should bear in mind that the better condition in which they market their fruit, and the more attractively it is got up, the better the chance of its realising a satisfactory price.

During the month, the Orchard should be kept well cultivated, especially in districts where the rainfall is light; and in such districts, if water is available for irrigation, a good watering should be given to all fruit trees and vines. By a good watering I don't mean damping the surface, but giving the soil a thorough soaking, as one good watering is worth a dozen small ones. Attend to the summer pruning of all young trees, removing any superfluous branches and pinching back all strong growths. Attend to the cultivation of the nursery; stake all grafts or buds, so as to produce straight, well-grown trees, the bud or graft being topped at the height that it is wished to form the head of the future tree.

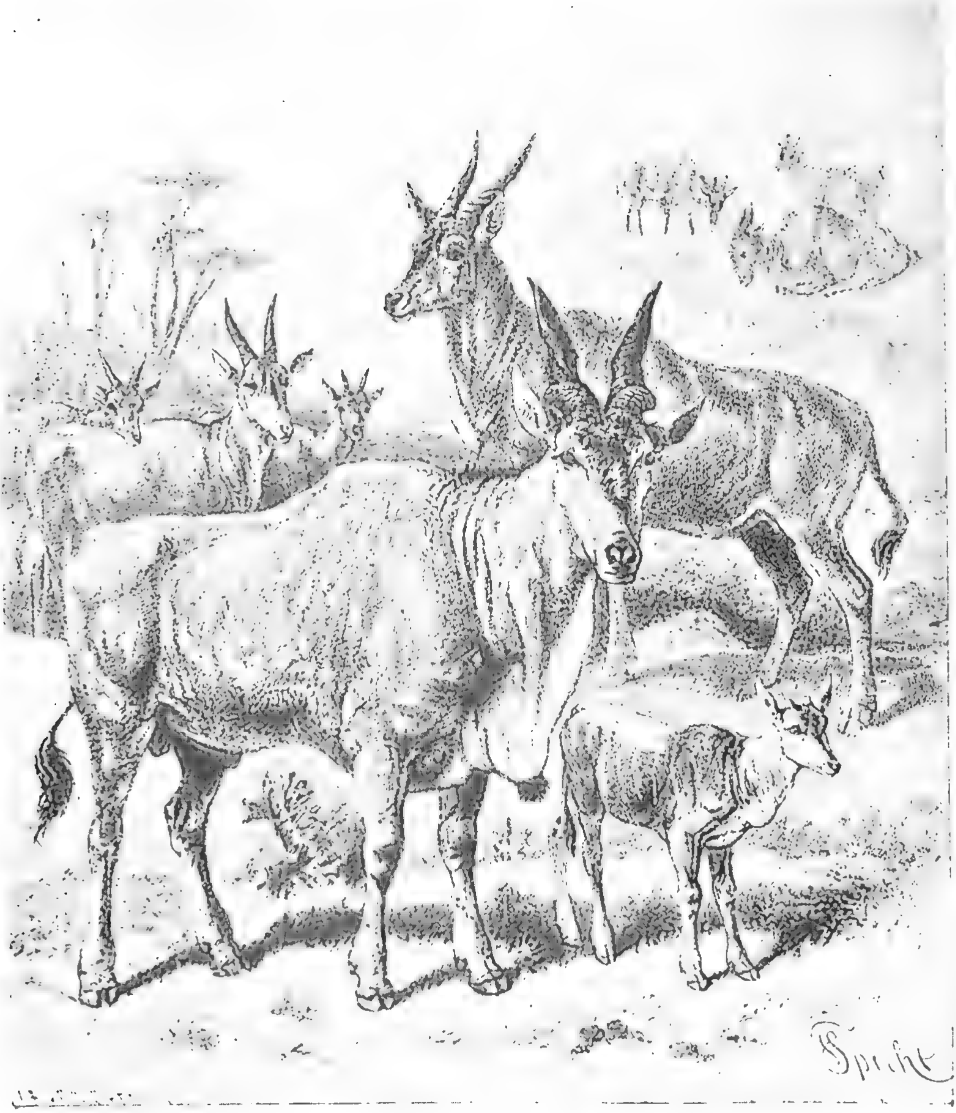
Farm and Garden Notes for December.

FARM.—During this month stripper, reaper, and binder, and here and there a harvester will be in full swing over what at the moment of this writing appears to be as fine a crop of cereals as has ever been grown in Queensland. It is much to be regretted that during October, the barley crops, particularly at Westbrook, were attacked by caterpillars, which necessitated the cutting of some areas for hay. Fortunately the frosts in the early part of October were light and did not in any way affect the wheat. Every effort should now be made to get in the harvest speedily, as there may possibly be some showery weather. In such cases barley should be most carefully stacked, otherwise it will be discoloured. It should not be stacked until thoroughly dry, and should remain from six weeks to two months in the stack before being threshed. Maize may still be sown on large areas, also sorghum, imphee, Kafir corn, and panicum. Arrowroot, ginger, and sweet potatoes may be planted. Attend to tobacco, and keep all crops clean, and thin out where too closely planted.

KITCHEN GARDEN.—Gather French beans, cucumbers, vegetable marrows, &c. as soon as they are fit for use. Even if not required for the table or for sale, gather them, as the plants will leave off bearing if the fruit is left standing. French beans may still be sown, and also the sweet varieties of maize for summer vegetables. The cobs in the milk stage are excellent for the table, and should be more extensively used than is now the case. It is almost too hot to grow lettuce and other salads, but with care and subsequent judicious watering and with the application of liquid manure many seeds may be sown; cucumbers, melons, &c., may thus still be sown. Tomatoes should now be in full bearing. Onions should be ready to take up and store. Spread them out thinly in an open shed until the tops wither sufficiently to pull off easily. Grade them into sizes before marketing. Sow cabbage and cauliflower seed for early plants. Some difficulty will be experienced in raising and protecting the young plants, but they will be proportionately more valuable if intended for sale. Remove all rubbish either by burning or digging in, as rubbish heaps form excellent harbours for insect pests.

FLOWER GARDEN.—A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Make a small sowing of each. If you have amaranthus pricked off ready for planting, you may plant them out now. Plant them in masses against a dark background of foliage when the gorgeous colours will show up to advantage. Annuals which have done flowering should be cleared away at once. As grass lawns are a chief attraction, care should be taken to keep them closely mown. Keep all walks clear of weeds. Perpetual roses may be cut back so as to obtain fresh wood for bloom. If aphis or Rose Scale makes its appearance, spray with kerosene emulsion. Chrysanthemums will require a great deal of attention such as pinching and staking. Give them frequent waterings with weak liquid manure and allow no suckers to grow till flowering is over. Treat dahlias to frequent waterings and liquid manure, keep them well staked up. Bulbs which have finished flowering should be taken up when the leaves are quite dead.

[*Frontispiece.*



GROUP OF ELANDS.

Agriculture.

FIRST STEPS IN AGRICULTURE.

5th Lesson.

SECOND STAGE.

By A. J. B.

In the 9th Lesson of the 1st Book, I told you that cultivated land requires "Rest." Giving the soil a rest simply means taking no crops off it for a time, or else growing such green crops, after cereal crops (wheat, oats, barley, maize, &c.), as will not interfere with the cleaning and thorough stirring of the land. This is one of the most ancient principles of farming, and is called "Fallowing." If you refer to the Bible, you will find that the Jewish farmers were commanded to let the land rest every seventh year. The old Roman farmers quite understood the necessity for fallowing in their day. Fallowing is of two kinds, Bare or Naked Fallow and Cover Fallow. Bare-fallowing means ploughing up the soil and leaving it exposed to the frosts and snows of winter (in cold countries, of course); here in Queensland we would say exposed to the influence of the weather. In spring it is ploughed again, then harrowed, and then cross-ploughed twice. This cleans the land, helps the mineral matter of value to the crops to become soluble, and, when the clods are all broken down to a fine surface, the soil will absorb nitrogen from the air. So you see bare fallowing does good; but it should only be done on stiff, clay lands, and then will only succeed in a dry climate. You remember I told you that in heavy rains great quantities of plant food, especially nitrogen, are washed out of the soil, and you can easily understand what loss there must be on a bare fallow in such a case. There are two other reasons why bare fallowing should not be practised. One is, that you have no crop while the land is resting, and weeds grow which must be ploughed under occasionally. The other is, the great cost of ploughing and harrowing for no crops.

The old Romans and Jews were obliged to bare fallow, because they knew nothing of a great many plants which we are acquainted with; indeed, they seem to have known of only grass and grain as field crops, and, not having anything like our good methods of draining and breaking down the soil, they were obliged to resort to bare-fallowing to keep their land in good tilth and in a state of fertility.

In our hot and comparatively dry climate, bare-fallowing is not a good plan. Instead of leaving a field naked and bare, the modern plan of cover-fallowing is most suitable for us. You can quite understand that the poorer the soil the greater the necessity for a green crop which can be ploughed under as manure, and for these fallow crops, as they are called, beans, vetches, lupines, and other "leguminous" plants are sown. The reason for this has only been known of late years. In explanation, I will ask you to look upon every acre of soil as the home of countless myriads of tiny animals, called Organisms, a living mass of microbes (from *micros*, small) so very minute that they can only be seen by the help of a powerful microscope, and hence are called "micro-organisms." Their business is to prepare the land for the use of the crop. Agricultural chemists have discovered this, and also that the green crops collect nitrogen from the atmosphere, which is kept in the soil by the help of these microbes, or bacteria, as they are usually called, who thus assist the farmer in keeping up the fertility of the soil of his farm.

Now, examine the roots of this pea plant. You see a number of little swellings on them. These are caused by the bacteria forming the nitrogen for the enrichment of the soil. You have noticed, in many parts of this State, a plant people call indigo. This is one of the Pea family—the Darling Pea, whose roots are covered with those little swellings. Now, where much of this plant grows, the crops thrive very well, showing that plants of the Pea family are most useful for adding to the soil fertility in a manner which few other plants can do. In the Northern canefields, when a field no longer produces sufficiently good crops of sugar-cane, the land is ploughed up and a fallow crop of Mauritius beans or cow peas is sown and afterwards ploughed in.

Both kinds of fallowing really give the land a change, and, in one sense, a rest, as I explained to you before. You may have the best climate in the world, and the richest soil; but there must be a limit to its capacity for profitable cultivation. Those farmers who treat their soils with respect, who, at the proper period, alternate fallow-crops with cereals, and who apply the right fertilisers in proper quantities, find themselves far better off than those who try to get the very utmost out of the soil without any attention to the principles of good farming.

One of the first steps in agriculture is to learn the correct treatment of your own particular soil. It is what every farmer must learn for himself, because different soils require different treatment.

A sour, ill-natured soil requires the stimulating effect of drainage, lime, and fallowing. A rich, fat soil, on the other hand, will yield rich harvests, if tilled deep and well, for a long time without this assistance. Then, as you learn the particular nature of your soil, you will find that such knowledge is power, and will enable you to become a good and consequently successful farmer.

Closely connected with fallowing is the ROTATION OF CROPS, which will form the subject of our next lesson.

Questions on Lesson 5.

1. What do you understand by fallowing?
2. State the difference between "bare" and "cover-fallowing"?
3. How is bare-fallowing carried out? What effect has it on the soil?
4. What is cover-fallowing, and what advantages has it over bare-fallowing?
5. Why did the ancient Romans and Jews fallow their land?
6. Is bare-fallowing advisable in a wet country? Why not?
7. What plants are used as fallow-crops? Why?
8. What are bacteria? What work do they perform?
9. What is the reason that plants of the Pea family are useful as fallow-crops.
10. What treatment does a sour, bad soil require?

6TH LESSON.

SECOND STAGE.

The last two lessons—*i.e.*, those on manures and fallowing—were not intended for your particular study at this stage. They were to make you acquainted with several varieties of manures, and the different plant food they each contain, and also to teach you what must be done to restore the fertility of a so-called exhausted soil. You can always refer to these lessons as occasion arises later on. For the same reason I am now about to talk to you about the ROTATION of crops as a preparation for a future lesson on the subject.

You all probably know that on the rich, fertile soils of this State there is such a large amount of plant food of various kinds that when a scrub farm or

rich timbered land has been cleared, or when the black and red volcanic soils have been ploughed up, farmers plant the same crops for years on them, without diminishing the yield. Such VIRGIN soils, as they are called, need no care on the part of the farmer beyond good tillage, and keeping the weeds down, with here and there a little drainage perhaps. Weeds are the greatest trouble, especially on newly cleared scrub lands, where all work has to be done with the hand hoe for the first three years owing to the numerous stumps.

But, as I have already told you, there must come a time when the wonderful fertility of the once virgin soils becomes less. You must now know the reason for this. Make it a point of always asking "Why?" Find out the reason for all that happens, and all that requires to be done, and you will end by being an intelligent farmer. Then you begin to find out that it will not do to continue growing the same crop year after year. And this it is which has given rise to ROTATION OF CROPS. The word means the order in which certain crops follow each other. You know that some plants require more of one kind of food than others. If, therefore, you continue growing the same crop in succession, it will end by exhausting that particular ingredient. But, if you change the crop, such exhaustion of any particular plant food does not readily occur. For instance, wheat, maize, barley, and oats require a great deal of silica, but not much lime or potash; whilst rice, root crops, and leguminous plants require a great deal of lime and potash and very little silica. So you can quite understand that a very good crop of roots may be got where you would have had a poor crop of wheat, by making the root crop follow the wheat.

Again, many plants are DEEP ROOTERS, many are mere SURFACE ROOTERS. The deep-rooted plants draw their plant food from the sub-soil; but they draw up more than is required for their own use, and thus they leave a supply for the succeeding crop, which should be a surface rooter. Turnips, for instance, are surface feeders, and in countries where turnips are fed off by sheep an abundance of rich plant food is left for a following cereal crop.

Now, what are the advantages of rotation?

1. From what I have told you, you can easily perceive that the yield of each alternate crop will be increased.

2. Insect pests and fungus pests attack each its particular plant. If you find some insect devouring the wheat or barley crop, you can entirely get rid of it by planting something of an opposite nature on which it will not feed. Consequently the insects all die or are driven away in search of their favourite food.

3. The plant food required by one crop is not the same entirely as that required by another. Thus there is a saving in manure.

4. Rotation distributes farm labour throughout the year, and thereby economises by preventing extreme activity being followed by periods of idleness, and so enables the farmer to employ less labour with a better result.

5. If you keep dairy or store cattle or sheep, as all good farmers do, the rotation enables you to give them a necessary change of food.

6. Rotation gives you every chance of thoroughly cleaning the land, and in a good rotation one year's crops will be such as will not prevent the thorough tilling of the soil, and these crops are, as you learned in Lesson 5, called the fallow crops.

Alternation of leguminous and forage crops with hoed crops preserves fertility by means of the vegetable acids of the legumes acting as solvents—that is, dissolving the unavailable plant food when ploughed under.

Cow peas carry several times the weight of roots that cereals do; and as they are very much richer in nitrogen than wheat or oats, therefore wheat or oats should follow cow peas. Cucumbers take up 2 lb. of potash to 1 of phosphoric acid, while pumpkins only take up $\frac{6}{10}$ lb. Cabbages take up 11 lb. of potash to 1 of phosphoric acid; but maize only takes up $3\frac{7}{10}$ to 1, and so on. So you see, if you were to grow cabbages continually on a piece of land,

you would soon lose all the potash in it, and then, unless you supplied more, you could no longer grow cabbages; but wheat, which is not so greedy for potash, will thrive after cabbages.

Just to illustrate this to you, let us suppose that in your garden there are four kinds of fruit, and four of you are allowed to eat as much as you like every day. Say that there are oranges, guavas, passion fruit, and strawberries. If every one of you liked strawberries better than anything else, the strawberry bed would be cleared before the other fruit. You do not care for the other fruit much, so you leave the garden. Now, three other boys are sent in. They like all fruit, but one likes guavas best, another oranges, the third prefers passion fruit, but all take some of each. As neither of the varieties of fruit is consumed exactly in the same proportion, it takes a much longer time to dispose of it than in the case of the strawberries, so there is still some left for other boys.

So it is with the crops I have told you of—one plant will use up much more of a particular ingredient than another, and the knowledge that this is so enables the farmer to raise good crops of several kinds by merely taking care to change the order of sowing or planting.

Now, I will give you an example by telling you what was done by some of the old wheat-growers in Victoria. In that State flax is grown. Flax produces linseed, and linseed is very valuable in the dairying business. Now, linseed grown in alternation with wheat gives good results in this way: A crop of linseed takes up a different set of soil constituents (or plant food) for its nourishment to that which cereals (wheat, maize, oats, barley, &c.) require. and it has been proved that it exercises a good fertilising influence, and this effect is well known to growers in South Australia, especially in one part of the State which was famous for flax-growing. Consequently the wheat farmers grew a crop of linseed followed by wheat. When this was known in Victoria, a farmer of that State tried a crop of flax on a piece of land which had become "grain-sick" from constant cropping with wheat, and the result was that he got an excellent crop of linseed followed by a big wheat yield. This is a very good instance of the good effects of rotation.

Now, there are certain rules to be observed in rotation, and several writers have stated them as follows:—

Such plants as tend to particularly exhaust the soil, like grain crops, should only be sown when the land is in "good heart"—*i.e.*, perfectly fertile like the virgin soils I have mentioned. They ought not to succeed each other, but should be followed by plants which are less exhausting.

It is a good thing to alternate plants that have tap roots with those which have spreading roots.

No two crops which favour the growth of weeds should follow each other.

And the same with insects and fungi.

Crops should be changed frequently to hinder the increase of these pests.

You have probably heard farmers complain of the wire-worm and cut-worm attacking the wheat and barley.

Now, to get rid of that ruinous pest, a crop of turnips or beans should be sown, and then the whole tribe of grain insects may perish or disappear for want of proper food. The sugar beet is so liable to disease that in Germany they say that sugar beets should not be grown on any field oftener than once in every six or eight years.

Now, I am not going to explain to you the various rotations employed in different parts of the world. We shall come to them by and by, but the following FOUR-COURSE OR NORFOLK ROTATION will just give you an insight into the method.

The Norfolk rotation is a very old one, probably 100 years old. It is called "FOUR-COURSE" because it consists of a series of four crops, each of which comes round on the same land in proper order every four years. It is adopted mainly on light soils.

To carry out this rotation, the farm is divided into four fields, and I cannot do better than give you a table prepared by Professor R. Hedger Wallace, who used to lecture on agriculture in Victoria:—

FOUR-COURSE OR NORFOLK ROTATION.

—	Field 1.	Field 2.	Field 3.	Field 4.
First Year ...	Cropped Fallow, Turnips, and Swedes	Barley	Clover	Wheat
Second Year	Barley	Clover	Wheat	Fallow
Third Year	Clover	Wheat	Fallow	Barley
Fourth Year	Wheat	Fallow	Barley	Clover

The first thing you must notice about this rotation is that *half* the farm is producing *wheat and barley* for market; and *half, fodder* for sheep. Also, that the fodder crops are grown alternately with the *corn* crops, and that the first fodder and corn crops are *surface feeders*, and the second *subsoil feeders*. Further, that the land undergoes a thorough *tillage* and *cleaning* every fourth year. By the frequent growth of fodder crops and thorough tillage, the fertility of the land is kept up.

In a future lesson I will more fully explain the important matter of rotation of crops.

Questions on Lesson 6.

1. Why can successive crops of one kind be grown on the newly-cleared lands in Queensland?
2. What must be done when the land begins to be exhausted?
3. What is meant by rotation of crops?
4. How do deep-rooting plants assist surface rooters?
5. What are the advantages of rotation?
6. In what way do cucumbers, pumpkins, cereals, and cabbages differ in the plant food they take up?
7. Name some of the rules to be observed in rotation.
8. Describe the "four-course or Norfolk rotation."
9. What do you notice about this rotation?

7th Lesson.

SECOND STAGE.

Before we begin this lesson I want to impress upon you that this and all the foregoing lessons are only easy steps to a higher and more scientific study of the profession of agriculture. Do not imagine that you know all about the soil and manures, and about renovating worn-out soils from what you have read. You have merely been climbing the lower rungs of the ladder, and it is a very long way to the top; but with patience, diligence, and a determination to succeed you will get there all right. There was a funny man who once said to a person who thought himself very wise: "The man who does not know anything and DOES NOT KNOW that he does not know anything is a hopeless case; but the man who does not know anything and KNOWS that he does not know anything is pretty sure to go ahead." So just bear in mind that there are many things you do not know, and never be ashamed to confess that you do not know. Ask questions—sensible ones, of course. Get to know the reason for every agricultural operation you see being done. Do not rest content with learning out of a book. Books are all very well; but they are only meant as helps to the understanding. Use your eyes, your intelligence, and your hands. No profession can be learnt without practice. What sort of a sailor do you think a man would make who had learned by heart every part of a

ship's rigging and sails, and knew every manœuvre by heart, but had never seen the sea or touched a rope on a ship?

The same thing applies to the lad who wants to be a farmer. He must use the tools of trade, as well as look on. So what you should do is, if possible, to get hold of a bit of garden ground to begin with, and learn how to work the soil, how to sow different seeds, how to distinguish weeds from plants, &c. You might, by and by, make small experiments with manure, especially if the soil be not too rich. A rich soil will not give you so many opportunities for this as a poorer one.

Now, we will get on with the improvement of our exhausted toil. The third method of helping to restore its fertility is GREEN MANURING. By green manuring—that is, growing a crop of cow peas, rape, lupines, or some crop of the pea or bean family which grows quickly, and ploughing it in before it attains maturity—a large quantity of the needful ORGANIC matter is returned to the soil. Without HUMUS, the soil becomes lifeless and cannot exert any great influence on plant life, and, furthermore, it will not assist the action of fertilisers. So that the necessary ingredient must be supplied by either farmyard manure or green manure. But the latter will not be entirely successful unless there is a proper supply of organic and mineral manures, such as potash, lime, and phosphoric acid, in the soils on which the crops are grown. The leguminous plants I have mentioned furnish a large supply of that very necessary element—nitrogen. That supply they obtain from the air, and they give it up to the soil in different quantities, according to the crop sown.

Thus the amount of nitrogen drawn from the air by the green crops and released in the soil varies from 53 lb. to 134 lb. per acre. If a leguminous crop is ploughed in green, the amount of nitrogen resulting from it is equivalent to a good dressing of nitrogenous manure—such as nitrate of soda, sulphate of ammonia, or farmyard manure. Even if the leaves are used for fodder, yet the roots and stems remaining in the ground contain enough nitrogen to ensure a full yield of cereals or other plants. The nitrogen is contained in the little nodules or swellings on the roots of the plants, and these are not always easy to find. When you pull up a plant violently, you probably leave most of them in the ground. But if you take up the plant carefully and remove the soil gently, you will find them. If you find no nodules then there is no nitrogen taken in by the plant, and the soil is as poor as before, except for the humus produced by the plant when ploughed in. When a green crop is allowed to grow—say to the flowering stage—it has gathered up quantities of plant food from the air, the soil, and from the water of the soil. When the crop is buried the whole of this collection is returned to the soil, which is thus made fertile. Besides the nitrogen, there is a large quantity of carbonic acid, which dissolves other plant food and makes it available for the succeeding crop.

Even sandy soils which will not retain water have been so altered by regularly ploughing in green crops that they will afterwards retain both water and manure.

Most people think that green manuring is a modern idea, but in a sense it is as old as the early days of agriculture. You remember what I told you about fallowing (5th Lesson)—viz., that it is a means of cleaning the land of weeds. What becomes of the weeds? They are ploughed under as often as they appear, until at last they are banished. Now, this was nothing more or less than green manuring. The rotten weeds turned into humus, and so helped to enrich the soil. But our scientific men have discovered that certain plants collect more nitrogen than others, and hence are more valuable when buried.

The very best plant for the purpose is the white lupine, because it roots deeply, grows quickly, and bears a quantity of leaves. In this State, however, the cow pea is used, particularly on the sugar plantations.

The velvet bean is a very good plant also, as it produces an enormous amount of organic matter.

There is one danger about green manuring which it is well you should know. If a drought comes on immediately after ploughing in a heavy green

crop on a light soil, you will have done more harm than good, because the plants will not rot. The moisture will evaporate from the soil rendered more open by the buried plants, and only by careful rolling and harrowing and cultivation of the surface will you get a succeeding crop.

Many farmers do not believe in this method of renewing the fertility of the soil. They say it is much better to harvest the crop of cow pea, velvet bean, maize, or peas; feed it to stock, and then put the resulting manure on the land. This is called "*soiling*," of which you will hear more hereafter. But all farmers, especially cane farmers, do not keep any stock except the horses for the farm work and a few cows and pigs, so that they could not get enough manure to fully cover the land. Such farmers sow the cow pea, and find it usually a great advantage to do so. There is no doubt that the ploughing in of green crops at the proper season has a wonderful effect in increasing the fertility of the soil. Now, you can easily prove this even in your little bit of garden. Sow a few peas or beans. Let them grow till they flower, then dig them under. They will soon rot. Then sow a little wheat or some maize on that patch, and sow the same quantity on a patch not manured with the peas. Watch the growth, the colour of the green flag, the height of the straw, the size of the ear, the number and size of the grains, the weight of the little crop, the time the wheat took to come to maturity. Then compare the yields of the two patches. You should also make a note of the number of times rain fell, of the frosty nights, of everything, in fact, which helped or hindered the growth of the plants. Then you would learn by your own experience what I have been trying to teach you here—the value of green manuring.

In Germany in one field 200 lb. more grain and 420 lb. more chaff were produced on a plot manured with cow peas than were obtained after a bare fallow.

Green manure sometimes acts very slowly. This is worth your attention. The inorganic matters and the nitrogen in the buried plants are not all consumed by the living crop, because the dead ones have not been completely rotted, so that something will be left to assist a second crop.

Now, although I have told you as much as you need know about green manuring, it is not often practised except in the case of sugar-cane fields. First, because where there is plenty of live stock it is better to feed the green fodder to them and put the manure on the land. Secondly, because if the green crop is a thrifty one like cow peas, it pays better to harvest the crop. There is another thing to be noted—that is, that time must be given to the buried plants to be destroyed; otherwise the next crop sown may also be destroyed. Finally, remember that if green manuring is done it should be done thoroughly—that is to say, that the heaviest possible crop should be grown by the help of fertilisers, and then plough in such a mass of plants as will equal a fair manuring with farmyard manure.

Now, this lesson is long enough, and I will set you a few questions on it. Our next will deal with drainage, and after that we will talk about irrigation.

Questions on Lesson 7.

1. What is meant by green manuring?
2. What is the object of green manuring?
3. Explain the process.
4. What plants are most suitable for green manure? Why?
5. How can you tell whether a plant can furnish a supply of nitrogen to the soil?
6. At what stage of growth should the green crop be buried?
7. What effect has green manuring on sandy soils?
8. Mention a possible danger which may result from burying a heavy green crop.
7. Might not the crop be employed more usefully than by being ploughed in? In what way?
10. What should you be careful to do in order to get the best results from burying a green crop?

AGRICULTURE AT THE PRIMARY SCHOOL.

Mr. H. R. Julien, agricultural engineer, writes as follows on this subject in the *Revue Générale Agronomique* of February, 1901. The subject being of special interest to an agricultural and pastoral community such as ours in Queensland, we give our readers a translation of the article :—

AGRICULTURAL INSTRUCTION IN PRIMARY SCHOOLS.—THE PROFESSION OF THE AGRICULTURIST SHOULD BE HIGHLY ESTEEMED.—WHAT SHOULD BE LEARNT?—OCCASIONAL AND REGULAR INSTRUCTION.—CONCLUSION.

The principal object of instruction in agriculture in the primary schools should be to cause agriculture to be understood, honoured, and loved as it deserves to be; to elevate the profession in the eyes of the pupils as much as possible; to develop a taste in young people for the profession of the farmer, which is unjustly despised and treated with contempt in certain parts of the country. If farmers are exposed to many reverses, resulting from epidemic diseases, from accidents, from failure of crops; if, during certain seasons of the year, they have to do heavy, prolonged, and laborious work, it is none the less true that those who devote themselves to an intelligent cultivation of the soil find in their labour a satisfaction and pleasure which, other things being equal, one would look for in vain in most of the other professions.

Children in rural districts should learn at their school—when they have finished their term of study, they should be profoundly convinced that the farmer carries on an honourable and independent business; that agriculture is the most important of all national industries; that it is an inexhaustible source of wealth, for it alone produces, whilst other trades confine themselves to transforming the products of the soil and the materials elaborated by plants under the influence of the sun's rays. . . . .

To reach with certainty this highly desirable result, the germ of it must be implanted in the mind of the young pupil by giving him correct ideas of the conditions under which the agricultural industry must be carried on at the present day.

There is no one so well able to work upon the intelligence, the tendencies, and the tastes of children as the capable instructor who is imbued with a deep sense of the noble mission confided to him.

To cause agriculture to be esteemed and loved by children, they must be shown how estimable and worthy of their love it is. The profession of the farmer does not solely consist, as some even yet believe, in a routine or in machine-like work which the first-comer can rapidly acquire without any effort by personal experience or by observing how things are done in his neighbourhood. On the contrary, it is a science which must be carried on by intelligent people, who know how to get at the why and the wherefore of the operations as numerous as they are varied which they undertake.

It is not, therefore, sufficient to bring under their notice but to make them see and understand the different kinds of work done in the fields, the orchards, and the farms. It is the most suitable means of making them acquire a reasoning knowledge, a knowledge of daily application concerning the cultivation of various plants, the study of domestic animals, of parasites, of the nature of arable soils, of the value and action of manures, of the multifarious labours of the farm.

It is not necessary to learn everything at the primary school, and no sensible person would pretend to educate the pupils there to become finished farmers. But what may be demanded of them is that at the end of their school life they should possess sufficient knowledge to continue to instruct themselves by the observation and interpretation of such phenomena as frequently present themselves when reading the daily papers, reviews, and agricultural works, by the assistance everywhere given at agricultural conferences by State experts in agriculture, by the dairy experts, by the professors of courses of agriculture for adults, professors of horticulture, of market gardening, of apiculture, &c.

To attain this end, it is not sufficient to let them learn some manual by heart, but it is indispensable to develop in the students a spirit of observation, to inspire them with a taste for study, to make them acquire those fundamental principles which are indispensable to a clear understanding of the subject.

Is *occasional* instruction sufficient to arrive at this result?

Evidently it is not. It is decidedly necessary for the instructor to seize every possible opportunity to instil into the minds of the students useful ideas concerning the farmer's profession, but such instruction must be complete, and it should be preceded by *regular and didactic* teaching.

A rigidly straight course must be adhered to—a logical sequence—in order that the child may not be confused with a mass of jumbled-up ideas which are disconnected, and do not fit in one upon the other. Regular instruction should form the basis of the whole edifice. It comprises the study of the principles of the fundamental laws on which the science of agriculture is founded.

Occasional instruction is the indispensable complement of regular instruction. Its aim is to make itself understood by well-chosen object lessons, by walks abroad, by conversation, by problems, by excursions, by practical work, by experiments. It must force its way into the intelligence of the child, and consequently this theoretical instruction must not consist of lessons "by heart," but it must be digested, assimilated, understood.

One must not deal merely in words or definitions, but the teaching must above all develop in the pupil the ideas, the reasoning powers, the aptitude to instruct himself later on by his own energy and of his own accord. And this is precisely the reason for reducing everything to scientific principles, and of accepting or rejecting good and bad methods according to whether they agree with or are opposed to the immutable laws which regulate the matter and activity of living beings.

It is only in this manner that the primary school will evolve intelligent cultivators of the soil in numbers anxious to follow with determination and prudence the modern methods by which agriculture, forced by necessity, has since a considerable time begun to elevate itself.

Agricultural teaching is too often as wearisome as barren of result, because a wrong direction is taken, because teachers allow themselves to be guided by a defective method. At the same time we do not deny, having seen them at work, that many teachers stand at the head of the noble and important mission entrusted to them, and we do not hesitate to assert that their fruitful lessons and instruction have had their share in the immense progress achieved during these last few years in many parts of the country.

HOW THE EXTENSION OF AGRICULTURE BENEFITS THE CITY WORKERS.

How to keep our boys and young men on the land has been a problem which individual farmers have solved for themselves, but which still remains a problem to the generality of them. There was a time in the old country when farms descended from generation to generation, the young people never dreaming of doing anything but following in their fathers' and grandfathers' footsteps, turning and re-turning the furrows as they were turned and re-turned a hundred years before they were born. Why then is it that the farmers' sons and daughters no longer care for what they consider a humdrum life of toil without adequate remuneration? The causes may be found in (*a*) education, (*b*) increased facilities for travelling, (*c*) the attractions of emigration, (*d*) the attractions of the towns.

How is education answerable for the abandonment of a rural life? It is not education itself which is answerable, but it is the kind of education given up till very lately in every school—primary, national, grammar, and private

schools—in all Great Britain and her colonies. Nothing has ever been taught in any of them, tending in the remotest degree to educate a lad or a girl to rural occupation. The whole system has fitted the student for nothing else but the professions, for clerks, shopmen, &c. They have learned to be, according to the old schoolboy oracle, either soldier, sailor, parson, tailor, ploughboy, apothecary, gentleman, or thief. Note the ploughboy; no mention is made of the farmer. The boy was not taught anything so low as agriculture. The farmer's boy goes to school. He learns Euclid, latin, algebra, grammar, geography, probably dancing, and the piano, all things most useful to a farmer. What he has thus imbibed gives him the idea that with these accomplishments he can do better in the city, enjoy more—not comfort, but leisure—and have more pleasures than are possible on a farm; so the deluded youth, deluded and robbed of an honourable, independent profession by those blind guides who professed to fit him for his passage through life, this much-wronged lad abandons the farm and becomes a city office boy or clerk, and he is lucky if ever he rises to be anything but a clerk. What he has not learnt at those schools has been what would have given him a keen interest in the land and its crops, what would have lightened his labour, what would have increased his and his family's comfort, and what would have helped to swell his banking account, and what would have made him for ever independent of those city masters who grow wealthy by the sweat of the brow of their servants.

In this sense, then, we say that education has been one of the factors in drawing the farmer's son from the land.

Next take the increased facilities for travelling. A hundred years ago farmers rarely saw any other town but the nearest market town of their own country. A visit to "Lunnon town," Dunedin, or Dublin was hardly ever dreamt of by the boldest farmer. And if he did travel 100 miles, he first made his will, the wife of his bosom and the household generally wept in unison, and if he returned safely he was looked on as a wonderful traveller. In Australia it used to be much the same thing. Before railways were built the roads were mere tracks, all travelling was done on horseback or by bullock dray, bushrangers were not unknown, and living in the larger towns was very expensive. So the plain or scrub farmer only visited the town at which he sold his produce. There was no inducement for the young men to settle in the towns, because there was no opening for them, trade was small, and amusement was rare.

See how things have changed. The railways came along, goldfields, coalfields, opal-fields, tinfields, copper, and, best of all, canefields sprang into existence. All kinds of businesses, trades, and professions offered employment to young men possessing only the education we have indicated. Distance had been annihilated. The educated farmer's son could take employment in the large towns at a low salary, because he was able to travel by rail at a cheap rate and live with his parents. Then he soon imbibed a love of town life, and a dislike for the toil and vicissitudes of farm life. If he were inclined towards mining, the railways, steamers, and coaches carried him quickly and comfortably to many of the gold, tin, or copper fields, whereas in the early days the weeks of dreary tramping to reach his destination deterred him from leaving home.

The British farmer's son inclined towards a life of adventure is induced by the alluring pictures presented to him by the immigration lecturer to leave his home and try fresh woods and pastures new. The unknown attracts him. He is weary of the monotony of old country rural life, and paints a fancy picture of life under sunny skies and under more exciting conditions, not knowing that 'tis but distance that lends enchantment to the view. But what is loss to the British agricultural population is gain to the colonial, for these farmer immigrants usually enter upon farming pursuits in the colonies. Their descendants, however, at the present day, are more attracted by the allurements of town life. The flannel shirt, canvas trousers, heavy bluchers, and slouch hat are gladly discarded for the more elegant costume of the city. The early and late hours necessitated by the routine of the farm are exchanged for the late hours of

the city—late to bed and late to rise. The theatres, dances, concerts, exhibitions, and picnics, the afternoon saunterings in the busy street, the convenience of 'buses, trams, cabs, trains. excursion steamers—all these tend to wean the farmer's son from a life of honourable independence to one of ill-paid servitude. Compare the young farmer with the young city clerk or budding civil servant. The former is engaged in a healthy pursuit, in a life-giving, open-air occupation. His house is his own, his land is his own. He owns no man as master. He has no troubles about rent, and very little has he to do with the butcher, baker, grocer, or draper. On a well-managed farm many household requirements are produced which the town dweller has to pay for. If he wants a holiday of a day, a week, or a month he has no one to consult but himself. His occupation, so far from being monotonous, is one of endless variety. The changes of the seasons, even of the weather, bring constant change to his work. Science and invention have placed powers in his hands which have reduced hand labour to a very limited sphere in the operations of the farm. True he suffers many disappointments. He has to take the chances of drought, flood, caterpillar, locust, parasitic and fungoid diseases attacking his crops, but this only stimulates him to action, and lends additional attractions to his occupation, inasmuch as he is by these troubles compelled to study the remedies. If farmers, taken as a body, are not men of great wealth, they are in comfortable circumstances. They have to obtain advances on their crops, says a carping critic of these lines. Possibly, indeed very probably, this contingency will often arise. But so good is the security offered by the farmer that in all civilised countries of the world (except a few in which Queensland is included) agricultural banks have been established which make advances to farmers at very low rates of interest, and it is not too much to say that for one farmer who goes into the insolvent court 10,000 shopkeepers, merchants, clerks, middlemen, and other business people of the towns take advantage of the insolvent laws. In conclusion, let us ask what is the result of the exodus of the rural population to the towns? It may be stated in a few words. The additional strength poured into the towns, which, as a rule, are generally overmanned with would-be workers, must necessarily tend to the reduction of wages, to an increase of taxation; and the low rate of wages from which the taxes have to be deducted results in much distress amongst those who are bound by family ties to live as best they may, obtain work as best they may, in cities where the influx from the country has cheapened labour or rendered it almost impossible of attainment.

We set out with the intention of showing "How the Extension of Agriculture would benefit the City Worker." We have shown how the city worker is injured by an oversupply of workers from the country districts. But, with our rich agricultural lands thrown open to selection on easy time-payments, with the repurchase of such fertile estates as the Government has so wisely bought back from the owners to sell again to the farmers, with the removal of any restrictions upon selection, the construction of light railway lines or even tramlines as feeders to the main lines, the sinking of bores, the dissemination of information by means of travelling experts, the removal of prohibitive duties on agricultural machinery, and on everything required by the farmer for conducting his business, the lowering of railway rates on agricultural produce, the distribution of seeds, the importation of new varieties of plants, of stock of all kinds, the establishment of agricultural colleges and of State experiment farms, the free issue of agricultural literature, the holding of annual agricultural conferences—with these and a host of other advantages we could mention, the extension of agriculture must follow as a matter of course, and as thousands of acres of new land come under cultivation the demand for not mere mechanical farm drudges, but for workers on scientific principles with scientific appliances, must at no distant date result in relieving the towns of the best, healthiest, and most honest labourers and mechanics. As a consequence wages in the cities must rise, the cost of living would be reduced, and the up-to-date farmer could afford to pay a reasonably high wage to his men.

How then is the depopulation of the farms by the exodus of the sons of the house to be prevented? By affording less facilities for the education of rural children?—by reducing the facilities for travelling? On the contrary, it is by doubling and trebling these facilities that the object is most likely to be attained. It is the class of education that demands immediate reform. The curriculum of the rural primary school should have a totally different trend. Does anybody doubt this? Then, we say, look at the work done by the agricultural colleges of Europe, America, and in a lesser degree of Australia. Compare the numbers of those who have attended the higher schools of the ordinary classical or commercial type and the numbers of those who have gone through the three or five years' (in some cases) course of a good agricultural college; then follow the career of each batch of students. Those who have received the stereotyped school training will, taken as a whole (there are very many brilliant exceptions, of course), be found to hold positions in no way comparable to those held by students with the agricultural training. Hundreds, aye thousands, of young men have gone from the agricultural colleges into the world either as farmers of their own land, as graziers, as agricultural chemists, as farm managers, creamery and factory managers. They entered college with these objects in view, and they are successful, independent men. The ruck of the other schools hold their positions on a very precarious tenure. Let a panic occur in the money market, let a European war break out or a financial crisis occur, the farmer sits secure so far as his board and lodging are concerned, although he may lose his savings. The city worker in almost every capacity is what is delicately termed "retrenched"—that is, cut off from his means of livelihood. But he must feed his family, clothe them, pay his rent and taxes. With no employment, no savings to fall back upon, what remains for him but debt and the insolvent court when the great financial crash occurs? The farmer can live in his rent-free house, he can live on the produce of his land, on his cattle, sheep, swine, and poultry, and has no difficulty in selling enough produce to procure whatever else he needs, for city people and city horses have to be fed whoever pays for the food, and no one but the farmer can supply it.

It may be said that we paint the state of the farmer in too glowing colours. We only state the bare facts. We have tried it for many years, and therefore claim only to state the case as it stands. We merely assert that the farmer can live comfortably in times when a city worker would have to live by his wits. We also maintain that the love of a city life is injurious to the State in two ways at least: First, it robs the farm of its best supports. Secondly, it robs the genuine city worker of his just wage by over-supplying the labour market.

Ne sutor ultra crepidam is a very hackneyed aphorism, but we should like to see the farmers' boys act on it. It means "Let the shoemaker stick to his last." For their benefit we will render it thus: "Let the farmer's son stick to his father's farm."

SHEEP ON THE FARM.

In connection with what we wrote last month on this subject, Professor Lowrie, when speaking at the thirteenth congress of the Agricultural Bureau of South Australia, in September last, at Adelaide, touched, amongst other matters, on the value of a flock of sheep to the farmer. The *Journal of Agriculture* of South Australia reports what the professor said as follows:—

In this direction greater development is possible, and we can do more than we have done in the past through artificial manures. It is going to return money to us in a larger increase. I will give you an illustration of the value of this work, and the advantage gained from running sheep over the stubble land. This year I have 168 sheep and 104 lambs in a field of 150 acres, which must be considered good when the carrying capacity of the land previous to the use of

these manures is taken into consideration. As far as I can read it, it seems to me to be able to carry from half as much again to double as much. That land ten years ago would not have carried one-third of this stock. (Hear, hear.) I question if that field could have kept fifty ewes and lambs satisfactorily. I know this very well: That it would not have been in anything like the condition it is to-day. These lambs, I reckon, if sold, would realise from 8s. to 15s., or somewhere thereabout. I am perfectly sure of getting 8s. an acre from that paddock from the sale of the lambs. See where the advantage comes in. From the lambs alone I am getting all the money paid for the manures that I used. It is in that direction of sheep, then, that we, as farmers in South Australia, must look for the special development of the future. We cannot forecast what the home market is to be, but we must take our chances in that; and from the experience of past years we are justified, at any rate, in believing that it will continue so, or something similar, in the future. (Hear, hear.) Our farmers are more appreciative of sheep than they were. I believe the farmer has come to realise the importance of the trade, and the fact that the sheep enrich the ground. We have practically three times the number of farmers keeping sheep now compared with a few years ago. A report of an address I gave ten years ago says:—"On a farm of 700 or 800 acres he saw no reason why there should not be a £50 or £60 wool bill, and £40 obtained from sheep otherwise. The owner ought to have upwards of £100 a year for his sheep, and be nothing the poorer otherwise." That was in the days when the practice was neglected, and I was lecturing to a meeting of farmers in which I do not think there was one in twenty who kept sheep, and I was impressing upon them what a man could do on a farm of 700 acres. Sheep on a farm give you many advantages and profits which you could not otherwise obtain. So far as I can read there is no industry in this State that gives so much promise as this matter of keeping sheep, and breeding the best sort of lambs for export; and even if the farm should be small the farmers could keep a few sheep to advantage. You are getting the manure from your sheep, and so enriching the land; you are getting the wool, and altogether you are getting a handsome return. I think that if it is properly understood that fat lambs for export at any rate are to be handled with the very greatest care we will see—I am still thinking I am going to stay in South Australia—our lambs here will be on a level with the best fat lambs frozen in any part of the world. I do not think anything can be sweeter or firmer or better. I know there is a farmer in this meeting who has been many years amongst sheep in Great Britain, and he reckons that our fat lambs are nicer and plumper than anything he ever had the opportunity of putting his hands on. I do not see why it should not be so. Lambs elsewhere are forced on artificial food stuffs. They are fed on fodder crops, the flavour of which would very soon be noticed in butter if cows were fed on them, and to a certain degree you get it in mutton. I have tasted beef that fattened on white mustard, and the mustard was in the beef.

Mr. H. A. Giles (Mount Pleasant): Saltbush, too.

Professor Lowrie: Is that so? We have our natural vegetation, which is sweet, but if we will only feed our land as we ought to do we will get our lambs as fat and nice as it is possible for them to be; but if you send them down here and rush them through yards, and give them a kick as they go through, as men very often do, and lift them by the wool and throw them about, then South Australian lambs will never take first place in the home market. Lambs have to be handled as gently as if you were handling eggs or ripe peaches. However slight the bruise, only be the very faintest blood-burn, and though the manager of the produce depôt, or the Minister, who takes such a deep interest in it—a manager could not take more—although it may pass their eye, they think it is not much, when it goes out of the chamber it is a big black bluish blur. Let us think of that blot, let us handle these lambs as they should be handled, and let the proper stock be kept.

A Member: Shropshire rams.

Professor Lowrie: Another here says Lincolns, and another there says Dorset Horn. I would object much to have lambs with three breeds in them. If you have Merino and Lincoln, that is two strains, and you put Shropshire on to that, you get three. I have never tried it, and I am not sure whether any others have. If the College Farm had been big enough I would recommend that it should be tried, that we should get the two classes and keep them side by side, and take their total money returns on that particular land, and then I would be able to say whether the first cross or the half-bred lambs or the three-part bred, whether the Shropshire or the Lincoln, were the better money. I can only now argue from precedent, and I am arguing from the precedent of the South of Scotland and the North of England, than which there are fewer places in the world where farmers more appreciate sheep and know better how to work them. The conditions are different here. Their practice is to breed a three-part lamb and sell all the lambs, and they get a nice fine lot. Instead of having the Lincoln-Merino ewe and the Shropshire on top of that, I would have the half-bred Shropshire and the Shropshire on that. We can only argue from analogy. You would get a slightly less valuable fleece in the dams, but you would get a nicer, earlier, plumper lamb; and you can carry more of them, and I think it would pay you to breed them in that way. I have bred the Merino ewe and the Dorset Horn ram, and then put the Dorset Horn on the crossbred ewe. I do not know how that would compare with the three-part bred Shropshire. Mr. Rankine, who has had as much experience in breeding lambs as anyone here, and as much success in it, goes for the Southdown sheep for lambs, and practically for the pure-bred Southdown. Well, my experience in this State is only with the Dorset Horn-Merino and the three-part-bred Dorset Horn. The other day I weighed a few of these lambs to satisfy myself, and the best of them were these weights—two were 114 lb. each, then 112 lb., then 108 lb., 107 lb., 106 lb., and down to 95 lb. The average live weight of the first thirty that we weighed out of 104 lambs, lambed in May, was over 100 lb. Most of them were the three-part-bred lambs, though some of them were first cross. They would be 55 lb. or 56 lb., dressed—that is, getting too big for freezing. There was not a lamb down on the 1st of May, and if I had a good big flock I could have been shifting them some time ago. They come when the grass is forming on the stubble, and are away when the summer is coming, and thus we have the remainder of the feed for the sheep at the bad time, and that is where I think it is going to be a great thing in South Australia. By the time the feed is gone you have your stubbles, and everybody knows what they will do.

PASPALUM DILATATUM.

There are always diversities of opinion in agricultural, as well as in all other pursuits, and when any new plant or fruit has been introduced and tried in different localities under different conditions of soil, climate, and rainfall, the wonder would be if farmers or fruit-growers were unanimous in praise thereof or in denouncing it. So it is with the fodder-grass *Paspalum dilatatum.* "Oxonian," whose letter we printed in the last issue of the *Journal*, thinks it a good grass, but dangerous to grow on the cultivated land. J.D.Z., of Nerang River, in the following letter addressed to *Queensland Country Life*, approves highly of the grass. He says:—

Four years ago I sowed my first seed and also planted a few thousand roots to form a seed bed. My farm is now practically sowed with paspalum, and the more I see of it the better I like it. Of course I mix other grasses and clovers as a change for the stock, but paspalum is the basis of the pasture; it has proved itself a mainstay for the stock, growing vigorously when the fierce heat had withered up the other grasses. I have carefully observed it in all stages and variations, and I have come to the conclusion that *Paspalum dilatatum* is the very best grass for the farmer to rely upon as a permanent pasture. I say permanent advisedly, for after four years' grazing the paddocks

are still improving and giving an increased quantity of feed. It is with us carrying a beast to the acre all the year round, and yet, during this season I have in rotation been able to shut up every paddock, allowing the grass to grow and shed its seed By this method a perfect turf can be obtained; it does not spread from the roots and joints like some of the other paspalum grasses, of which there are great variety. It stands any amount of grazing, and the trampling of stock does not injure it. In this district it grows nearly all the year round, but naturally a little slower during July, August, and September. It stands drought well, the frosts do not kill it, and I have cut it down and run a fire over it, and after this severe treatment it grew as vigorously as ever. There is nothing hard or wiry about this grass. It is soft and succulent, and there is no part of it from the crown to the seedheads that the stock will not eat. My observation of grasses has extended over many countries, as well as over most of the Australian States, but I have never met with any grass that would equal *Paspalum dilatatum.*

I have no knowledge as to its value for sheep, but all other animals are fond of it, and keep up condition. Its qualities for dairying purposes are undoubted, and every cow is kept in such condition as to enable her to give her standard of quality in the milk produced. My average test at the milk separating station is amongst the very highest, ranging from 3·6 to 4·3 for butter fat. I have found the proper times to sow are—middle of July to middle of October, first week in December to first week in February. In the former it catches the spring rains, and in the latter the summer rains, both accompanied by heat, which appears very necessary. The quantity of seed to sow per acre varies with the requirements: 5 lb. to 8 lb. per acre on well-prepared ground will soon result in a good paddock. If 1½ lb. to 2 lb. per acre is sown, after grazing it should be held up about October, and allowed to grow and shed all its seed naturally. It will soon spring up, and the young grass, if anything like a favourable season takes place, will be fit to graze in May. I consider that allowing the grass to shed its seed naturally is the very best and surest method of thoroughly establishing the pasture.

As soon as the stalk begins to bend over and attain a light greenish straw colour is the time to commence picking. Deal very lightly with it or you will lose the best of the seed. The heads should then be taken into a barn and shaken. This shaking may be repeated two or three times next day, by which time all the matured seed will be obtained. In leaving the heads in heaps be very careful not to allow them to heat, or the seed will be spoiled. The heads may now for a day be turned and thrashed, and although the quality of seed obtained by this second manipulation is very inferior, still a percentage of it will germinate. It may be used, therefore, for thickly scattering over rough ground.

A great feature, too, in its favour is that it is not difficult to eradicate if a paddock should be required for cultivation. Ploughing alone would not do it, but by cultivation and bringing the plants to the surface, rolling and harrowing to free the roots from the soil, it quickly dies by exposure to the sun. It is very tenacious of life if soil should be left on the roots, especially in wet weather, but it does not grow from pieces of root like couch and some of the peas, but given plenty of cultivation and stirring and a few fine days and the trouble is over.

When the plants are far apart the grass grows into big tussocks, but as soon as the spaces are filled up it forms quite as good a turf as any of the other grasses.

There can be no question as to its being an invaluable grass, and it is now being eagerly sought for in this district since it has passed the stage of experiment.

We are frequently asked to give an opinion on the value of *Paspalum dilatatum* as a fodder grass, and have always quoted the experience of Mr. Mahon, Principal of the Agricultural College, as to its excellence, and that of

several farmers who have grown it and are satisfied of its great value. We were, therefore, surprised to receive a letter from a correspondent under the *nom de plume* of "Oxonian," in which he almost denounced it. In fairness to "Oxonian," we published the letter in the October issue of the *Journal*, but it is the only one out of a large number, which fails to praise the grass.

We have now received from Mr. Mahon the following letter on the subject, addressed to the Under Secretary for Agriculture, under date 31st October :—

"SIR,—Herewith I have the honour to forward letter received from Mr. P. McCallum, of Nanango, with reference to some *Paspalum* roots supplied last year.

"As the letter contains strong testimony as to the value of the grass for its drought-resisting and other valuable qualities, I consider it to be well worthy of publication in the *Agricultural Journal.*

"I have, &c.,

"JOHN MAHON, Principal."

Mr. McCallum's letter read as follows :—

I have no doubt but you will think I am very long in advising you how I got on with the *Paspalum dilatatum* roots. Out of the twenty roots you sent, not one missed. I planted them on the 24th July, 1900, in our house garden, which is on a dry ridge, with clay bottom. The spring was so dry I could not water them, not having any water to spare. Still they grew splendidly, and we had to occasionally put a horse in the garden to get a little green feed. Horses seemed so very fond of it that at last I thought it must die, for it was eaten off to the ground. Still, when we got the rain it shot up again, and I have been able to put out 500 more plants, which are all growing. I have, besides, given seventy to friends. Every bunch gave from fifty to seventy plants. From the seed I got about six plants, so next year I expect to have a good planting. Thanking you, yours respectfully,

PATRICK McCALLUM.

Further confirmation of the usefulness of paspalum is afforded in the following letter to the Principal of the Agricultural College :—

"Yeulba, 5th November, 1901.

"DEAR SIR,—Would you please send two more roots of *Paspalum dilatatum*. I have had three from you—one planted out in May and two in September—and, though we are having a fearfully dry time, they are green and flourishing. They are not equal in size, as from the first I had 120 plants and from the last two only 150.

"Yours faithfully,

(Signed) "J. P. MOLONY."

THISTLE AND BURRS.

A remarkable case, and one which should prove of interest to Queensland farmers, was tried in a Leicestershire County Court. A farmer in that county, says the *Agricultural Journal* (London), occupied certain land which had originally been forest land, but which had been brought into cultivation some years prior to the commencement of his tenancy. As is often the case with land which has been cleared, the soil proved to be full of dormant seeds awaiting a favourable opportunity to germinate, for no sooner was it cultivated than a profuse crop of thistles sprang up all over it. Whether it was that the farmer thought that nothing but thistles would grow, or whether he merely lacked the energy to cope with them, we do not know; we only know that he neglected to cut them, with the natural result that for two years in succession there was a large number of thistles on his land in full seed. His neighbour suffered great

damage by reason of the thistle seeds being carried by the wind in large quantities on to his land, and therefore brought an action in the county court to recover damages for the injury done to his land. The county court judge left to the jury the question whether the defendant, in not cutting the thistles, had been guilty of negligence. Taking a common-sense view of the matter, the jury found that he had shown negligence in the manner in which he had cultivated his land, and judgment was accordingly entered for the plaintiff.

Then followed the inevitable appeal. It was argued for the defendant that the facts disclosed no cause of action. Before a charge of negligence could be established against a person it must be shown that there was a duty on him to be careful. There was no such duty in this case—at all events, as between the two neighbours. The defendant could not be held responsible for the thistles, as he did not bring them on his land; they grew there naturally.

On the other hand, it was contended on behalf of the plaintiff that this was forest land, and if defendant's predecessor had not burned off the gorse, but had allowed it to remain in its original condition, the thistles would never have grown. By bringing it into cultivation, and so disturbing the natural state of things, he had caused the thistles to grow, thereby creating a nuisance on the land just as much as if he had intentionally grown them. By entering into occupation of the land with the nuisance on it, the defendant was under a duty to use and cultivate his land so that it did not cause damage to his neighbour.

Lord Esher, however, met this argument with the comment that the damage was not caused by any act of the defendant, and challenged counsel to quote any case which went so far as to say that if something came on to a man's land for which he is in no way responsible he was bound to remove it, or else prevent it causing injury to any of his neighbours. No authority being forthcoming, Lord Coleridge said he never heard of such an action as this, and there could be no duty as between adjoining occupiers to cut thistles, which were the natural growth of the soil. In the result the appeal was allowed, and the thistles were left in the white winter of their age to blow in peace.

Very little seems to have turned upon the fact that it was not defendant but his predecessor who cleared the land, and so gave the thistles a chance. In Lord Coleridge's view, no duty could exist as between adjoining occupiers to cut down the natural products of the soil, even although their growth had been first encouraged by the system of farming pursued by the actual occupier of the land.

It will be noticed, however, that the reason of the decision was that thistles were indigenous to the soil. The case does not go so far as to justify a man in annoying a neighbour by bringing on to the land something which was not there before, as by sowing the seed of a noxious plant, regardless of what the harvest will be.

Care must also be taken to distinguish this case from an action by a landlord against a tenant for bad farming. As between landlord and tenant, the latter is bound to farm in a husband-like manner, and, if he impoverished the land by growing an undue quantity of thistles, no doubt the landlord would have his remedy. But in this case there is a contract between the parties—there is none between adjoining occupiers, and hence there is no cause of action except in respect of a wrong, legally recognised, and committed independently of a contract.

The law, indeed, not only countenances the growth and seeding of weeds, but almost encourages them, by the responsibility which it places on the farmer who takes the trouble to clean his land and burn the rubbish. Over 200 years ago it was held that, if an occupier burns weeds so near to the boundary of his own land that damage ensues to the property of his neighbour, he is liable to an action for the amount of injury done, unless the accident be occasioned by a sudden blast which he could not foresee. Thus, if a farmer allows the seed of his thistles to blow, he runs less risk than if he burns it.

What, then, is to be done to abate a common nuisance, which the law does not recognise as a private or public wrong? Why not revert to the old idea of the land being farmed for the common good, and give parish councils power to repress noxious weeds as inimical to the welfare of the community?

In a country like ours, overrun in many parts by prickly pear, Noogoora, and Bathurst burr, lantana, *Sida retusa*, &c., many a farmer who keeps his land clean is put to double trouble owing to the slovenly farming of his neighbour, who allows his land to produce more noxious weeds than crops.

We know of no law by which a farmer or other person can be compelled to destroy noxious weeds on his own property, but divisional boards have power, after having declared a plant to be a noxious weed, to notify any proprietor or tenant of rateable land to destroy it if it appears on such land. Failing the owner doing so within a month of such notice, a board can enter on the property and carry out the work, charging all reasonable expenses to the owner. But one neighbour cannot interfere with another to compel him to clean his land.

JOHNSON GRASS.

We have from time to time warned farmers against the once much-lauded Johnson grass, yet there are still some who inquire where they can get the seed. The seed can be got from some seed merchants, we believe, in Brisbane. Our advice to would-be purchasers is to buy all the seed in Brisbane, and get some sawmiller to feed his furnaces with it to prevent the spread of this pernicious grass. Swamp-couch, lantana, *Sida retusa* are all harmless compared to Johnson grass. In Texas, U.S.A., the *Cotton Ginner's Journal* says that it has been encroaching to an extent that has finally become alarming to land-owners, and it is to-day one of the greatest menaces to agricultural prosperity in that State. Intelligent farmers apprehend that, if some means be not found to exterminate it, it will within twenty years blight the most fertile district in Texas. Of late it has spread at a wonderful rate, defying all efforts of the farmers who have tried to check, control, or destroy it.

It is said that for a season or two land given up to this grass will yield marketable hay in paying quantities, but this is soon over with, and the era of non-remunerativeness for land, which would otherwise sell at from 20 dollars to 40 dollars per acre, stares the owner in the face. As against the intrusion of Johnson grass the attack of boll weevils, grasshoppers, and other pests of that kind seem to be temporary evils, but this baneful grass has not yet been successfully coped with. It grows summer and winter, day and night, in the rain and in the sun, just as does a mortgage on a farm, and with equally disastrous results.

The *Louisiana Planter* says of it:—This well-known but unwelcome plant, which some misguided agriculturists have favoured in the past, is now coming to be generally considered as one of the most objectionable plants that could be introduced in any semi-tropical country, or in any country where the winters are not cold enough to freeze the roots in the ground sufficiently to extirpate the plant. Recently Mr. Ball, an expert of the U.S. Department of Agriculture, has been in Texas, and talked to the Farmers' Congress at College Station, on 25th July, on the war that should be made on Johnson grass.

RESULTS OF EXPERIMENTAL PLOTS IN THE NORTHERN WHEAT DISTRICTS OF VICTORIA, 1900-1901.

We have received the subjoined table of results of wheat tests in the northern districts of Victoria. We have no doubt that its publication in the *Journal* will be appreciated by wheat farmers in this State:—

AVERAGES OF EIGHTY-FIVE FIELDS.

Number of Plot	1	2	3	4	5	6	7	8	9	10	11	12
Manure given, per acre	10 lb. Concentrated Superphosphate.	No Manure.	20 lb. Concentrated Superphosphate.	30 lb. Concentrated Superphosphate.	No Manure.	50 lb. Ordinary Superphosphate.	56 lb. Thomas' Phosphate.	No Manure.	50 lb. Bonedust.	Same as 1, with 36 lb. Sulphate of Ammonia.	No Manure.	Same as 3, with 72 lb. Sulphate of Ammonia.
Cost of Manure, per acre, in 1900	1s. 1½d.	...	2s. 3d.	3s. 4½d.	...	2s. 3d.	2s. 3d.	...	2s. 3d.			
Serviceton to Nhill District	12·73	8·88	14·95	16·45	8·89	14·80	13·40	9·03	11·54	13·12	9·11	14·92
Averages of 16 fields	*3·85*	...	*6·07*	*7·57*	...	*5·86*	*4·41*	...	*2·48*	*4·04*	...	*5·81*
Jeparit to Dimboola District...	12·44	9·75	14·21	15·22	10·08	14·81	12·74	9·99	10·34	12·95	9·91	15·20
Averages of 9 fields	*2·69*	...	*4·35*	*5·25*	...	*4·76*	*2·72*	...	*·38*	*3·01*	...	*5·29*
Longerenong Agricultural College Farm ..	26·92	25·67	30·08	28·08	25·83	27·50	30·00	27·75	27·91	28·92	28·08	30·42
1 field	*1·25*	...	*4·36*	*2·31*	...	*1·03*	*1·89*	...	*·05*	*·95*	...	*2·34*
Beulah to Lubeck District	17·43	14·31	18·87	19·72	13·90	18·97	17·61	14·88	15·98	17·95	14·58	19·22
Averages of 19 fields	*3·12*	...	*4·73*	*5·69*	...	*4·74*	*3·08*	...	*1·20*	*3·27*	...	*4·64*
Donald to Boort District	18·29	15·85	19·62	19·68	15·18	19·04	17·27	15·04	15·74	17·46	15·11	18·67
Averages of 11 fields	*2·35*	...	*4·00*	*4·28*	...	*3·91*	*2·18*	...	*·68*	*2·38*	...	*3·56*
St. Arnaud District	16·17	11·99	17·99	18·82	12·22	19·20	18·89	12·83	14·61	18·51	13·19	18·79
Averages of 4 fields	*4·18*	...	*5·92*	*6·68*	...	*6·78*	*6·26*	...	*1·66*	*5·44*	...	*5·60*
Lake Boga to Swan Hill District	13·12	11·22	13·43	14·62	10·56	13·55	13·49	10·93	11·91	12·48	10·33	12·77
Averages of 5 fields	*1·90*	...	*2·43*	*3·84*	...	*2·87*	*2·69*	...	*1·21*	*1·98*	...	*2·44*
Maryborough District	15·74	13·44	17·64	18·58	12·64	16·53	16·57	14·31	15·92	13·88	12·98	15·17
Averages of 4 fields	*2·30*	...	*4·47*	*5·67*	...	*3·33*	*2·81*	...	*2·05*	*·45*	...	*2·19*
Elmore to Kyabram District	13·73	10·72	15·32	16·69	10·72	16·27	14·79	10·07	13·35	13·88	10·80	15·10
Averages of 5 fields	*3·01*	...	*4·60*	*5·97*	...	*5·76*	*4·50*	...	*3·03*	*3·34*	...	*4·30*
Tatura District	17·37	15·57	18·98	19·98	16·48	19·10	18·51	16·48	17·86	18·22	16·93	18·27
Averages of 5 fields	*1·80*	...	*3·11*	*3·81*	...	*2·62*	*2·03*	...	*·83*	*1·44*	...	*1·34*
Nathalia to Cobram District	11·11	10·23	11·17	11·84	10·24	11·59	11·45	9·97	10·43	10·83	10·31	11·14
Averages of 6 fields	*·88*	...	*·94*	*1·60*	...	*1·44*	*1·39*	...	*·35*	*·64*	...	*·83*
Averages of 85 fields	15·18 *2·80*	12·38 ...	16·71 *4·38*	17·61 *5·32*	12·24 ...	16·75 *4·40*	15·61 *3·19*	12·55 ...	13·91 *1·37*	15·30 *2·77*	12·52 ...	16·57 *4·05*

Note.—The upright figures, thus:—12·73, represent the actual yield of wheat from each plot, reckoned in bushels and hundredths of a bushel per acre. The sloping figures, thus:—*3·85*, underneath the upright figures, represent the gain due to the manure.

The plots in the Nathalia to Cobram district were sown late, owing to the operations being hindered by early rains. For this reason the yields were below the average of that district.

If the returns from Plot 6 be considered, it will be seen that 50 lb. of superphosphate, costing 2s. 3d., caused an increase of 4⅘ bushels of wheat, worth 11s. This was the average of 85 tests, including the good and the bad. At this rate every ton of the manure used as on Plot 6 would add nearly £25 sterling to the country's wealth; and every ton of the manure used as on Plot 3 would add £61.

A. N. PEARSON,
Chemist for Agriculture, &c.

THE IMPROVEMENT OF AGRICULTURAL SHOWS.

That there is considerable room for a change in the methods of conducting some agricultural shows is a statement that few will dispute. The trouble is that so many persons are directly interested in them that it becomes a case of "*quot homines, tot sententiæ*," or "many men, many minds." It would indeed be a wonder if every member of a show committee could be of one mind, or succeed in pleasing the whole of the exhibitors and the public. Show committees have very arduous duties thrust upon them, and the public are very apt to blame them for anything which in their—the public's—opinion goes wrong, when the committee have been doing their best to emulate the old man and his ass.

We are led to this remark in consequence of an essay which was written by Mr. George Turner, secretary of the Bowen Pastoral, Agricultural, and Mining Association, for which he was awarded a prize. The essay deals with the improvement of the Bowen Agricultural Show, but much of what Mr. Turner says will apply with equal force to some other country shows. For instance, some associations have a title which includes industries with which the district has absolutely no connection, as in the case of the Bowen association.

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The name of the society—Bowen Pastoral, Agricultural, and Mining Association—might with advantage be altered by substituting for "Mining" the word "Industrial," as for some years back neither the schedule nor the show has had the remotest connection with mining, while at least one-third of the exhibits may fairly be described as industrial, especially if that word be taken as including art and educational exhibits, in the same way that agricultural includes horticultural exhibits. This alteration would also justify the active interest taken in the association by townspeople who are not immediately connected with agricultural or pastoral pursuits. That the townsman's assistance is necessary to the success of the show may be taken for granted, not, as has sometimes been said, for the reason that the farmer is too slow to run a show, but that, owing to their living long distances apart, their long hours of work, bad roads, dark nights, and other inconveniences, it is very difficult for them to attend meetings often enough to make proper arrangements for a show.

The objects of the association should be to diffuse useful information on all subjects of interest to its members; to improve the quality and increase the quantity of the produce of the district; and to assist in the proper harvesting, preparing for export, shipping, and finding profitable markets for such produce. It should assist in the introduction and experimental trials of seeds or plants suitable for the district, exercising due care as to the purity and vitality of all seeds imported, as well as the strength and suitability of manures and fertilisers. It should deal with the rotation of crops, with a view to prevent exhaustion of the soil, or its restoration when exhausted; and should arrange for the analysis of soil, water, fertilisers, or by-products. It should interest itself in the best breeds of cattle for beef production or dairy purposes; the best horses for export or general farm work; and pigs, sheep, poultry, and dogs should all receive their due share of attention. It should be able to advise members as to the best kinds of fruit to grow, how to keep their orchards clean, pick, pack, cure, or preserve their fruit, and market it to the best advantage. It should forward a monthly report to the Department of Agriculture for publication in its *Journal*, showing the amount and kind of produce likely to be available during the following month, prices current, and any other information likely to attract customers, and should distribute amongst its members the like information gathered from other districts. If funds and premises were available, it should also have a museum where local and other specimens of produce could be inspected.

The prize schedule should be carfully drawn up by sub-committees appointed for each section, their aim being to advance the abovenamed objects

of the association by encouraging competition among its members. Due regard ought to be given to our geographical position, and some encouragement should be offered for the production of plants especially suitable for this part of the world. Out of 145 prizes offered by the last schedule only about half-a-dozen were for tropical or semi-tropical productions. When one thinks of the vast possibilities of this district in crops such as cotton, ginger, rice, tapioca, spices, fibre plants, tanning plants, &c., it seems strange that the association does not offer any encouragement for their growth. The schedule should say clearly what form the exhibit should take so as to facilitate the work of the judges. In plain sewing, if the prize was offered for a gentleman's shirt or other specified article, it would be easier to decide as to the best work than if the exhibits ranged from a doll's dress to a bed-quilt; and for the same reason prizes offered for works of art ought to be for foliage, landscape, animal life, or portraits. In crops which require preparation for market, it ought to be made clear whether they are required in their raw or marketable condition. The schedule should be drawn up several months before the date of the show, which ought, as far as possible, to be fixed by the farmers. It should be well advertised, and a sufficient number of copies printed to allow the sending of several copies to each kindred society, and at least one copy to every likely exhibitor in the district. The secretary, on whom a great deal of the success of the show depends, should be careful to keep up the interest in the matter by inserting in each issue of the local newspaper a paragraph recording progress, such as the number of entries received, special prizes donated, arrangements as to holidays, hours of opening, time and place of occurrence of special events, and the names of stewards and sections which they will control. This will cost nothing extra, as any newspaper with the interests of the district at heart will be very pleased to throw open its columns, and the few minutes spent by the secretary in jotting them down will be well repaid by the better attendance of the public.

The suggested expansion of the schedule necessarily implies an increased expenditure, but this may be easily overcome if a vigorous canvass is made for special prizes Circulars ought to be sent out to all those interested in the treatment or purchase of produce for shipment, to the shipping companies interested in an increase of such products, and to the seed merchants and implement manufacturers or importers with whom the producer deals, inviting them to contribute special prizes, and giving them the power to decide to what purpose their donations should be devoted.

The appointment of judges and stewards is a matter requiring careful thought. Two stewards, at least, should be appointed for each section. They should be fully instructed as to their duties, and their promise to act obtained, as any neglect on their part at the last minute may lead to serious confusion. The trend of opinion is now all in favour of the appointment of single and, if necessary, paid judges, as it is much better to rely on one responsible and duly qualified person than on a greater number of irresponsible persons lacking the necessary knowledge to give a proper decision. The association ought to be able to obtain the services of one or two of the Government experts to act as judges. If gentlemen like Messrs. Mahon and Benson were available, they could undertake the whole of the judging,* and the educational effects of the show would be greatly enhanced if they backed up their decisions by giving their reasons, which might be written out by the stewards as concisely as possible on a card to be attached to the exhibit. If invited to deliver a lecture at the conclusion of the show, they could then fully justify their decisions, and in this way impart a lot of useful information to future exhibitions.

* * * * * *

The exhibitor evidently requires advice as to choosing his exhibits. Both before and after the late show I could buy from exhibitors much better samples of vegetables than anything shown. It seems to be an accepted idea with

* Scarcely. The gentlemen named would certainly object to judge, say, sewing, embroidery, upholstering, &c.—Ed. *Q.A.J.*

exhibitors that nothing but abnormal growths are worth showing. At the late show beetroots and turnips were on show with hollows inside large enough to contain a rat's nest, and coarse enough for classification as samples of cabinet-making timber, while the same exhibitor had timidly hidden far better though smaller samples amongst his collection of vegetables. Several of the exhibitors deserve commendation for carefully naming each variety exhibited. This should be encouraged; but care must be taken to give the correct name, as great loss and disappointment will result to any person ordering seeds or especially fruit trees by name unless properly verified.

So long as plenty of space is available, tradesmen and others who desire to make a display of their goods ought to be encouraged to do so, and the association might with advantage offer a prize for the best-arranged display, discriminating as far as possible in favour of commodities likely to be required by producers—such as fertilisers, seeds, tools, &c. In the same way permission ought to be granted to implement-makers and others who wish to have a stand on the show-ground. Owners of gambling-tables and gentlemen selling brass watches and purses containing new farthings ought to be refused admission to the ground. Shooting galleries, Aunt Sally, and other amusements might be admitted, if space is available, but they ought to be made to pay in advance for the privilege.

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1901.

Farm.—The following work was performed on the farm during October:—An area of 37 acres, from which a crop of maize has lately been removed, has been ploughed. A plot of land on the hill, near the Principal's house, has been ploughed, and planted with sweet potatoes—five varieties. A large quantity of lucerne has been cut, made into hay, and carted to shed. An area of upwards of 40 acres in the farm paddock has been subdivided into 5-acre blocks, the corners of which have been marked by substantial hardwood posts. This will facilitate a record being kept of all crops planted thereon. It is proposed to adopt similar measures in the case of all our larger cultivation paddocks as soon as the crops are removed. Five acres of wheat in creek paddock have been reaped and stooked; this work was hindered by rain, re-stooking being necessary. Six and a-half acres, from which a crop of potatoes has lately been removed, have been planted with maize of the following varieties:—White Ninety-day, Horse Tooth, Hawkesbury Champion, and Golden King. An area of 8½ acres has been ploughed, and planted with ***Paspalum dilatatum*** grass. There is now an area of upwards of 17 acres under this grass. One hundred and twenty-five bags of maize have been threshed. We have now seed maize of the following varieties for disposal:—Golden Drop, Large Yellow, Ninety-day, Yellow Dent, and Golden King.

Potatoes, mangolds, and other root crops have been hoed and scuffled. Sixteen acres of malting barley have been reaped and stooked. The experimental crops, with the exception of stud wheats, are doing well, especially the mangolds that were treated with various manures. The plot treated with the barnyard manure has made the greatest growth. All the wheats, with the exception of the Belatourka, are slightly affected with rust; this necessitates their being cut and converted into hay. The rainfall for the month amounted to 3·02 inches for eight days. The heaviest falls were on the 8th (1·01), 12th (·50), 14th (·76).

Garden.—In this department a large amount of weeding and watering have been done amongst the vegetables, and beds for a succession of crops have been planted. The cabbage moth and grubs have rendered necessary a great deal of spraying. Cabbages have been sprayed with London purple, Paris green, and tar water; the latter has been found to be very effectual. Two horses have been kept constantly going throughout the month harrowing, scuffling,

and ploughing, and the garden is now in good order. The vineyard on the hill has been kept well cultivated; the vines have been frequently tied up, and were twice treated with sulphur; they are now in a healthy condition and making rapid growth. The vines on the creek have been once sulphured, and once treated with a mixture of sulphur and lime in equal proportions. The land has been twice scuffled, and all weeds have been kept down; the vines are all growing well. In the hill orchard all the the trees have been mulched, and the land has been kept well cultivated. A considerable amount of spraying has been done, especially in connection with the peaches and plums.

Dairy.—During the period under review, 1,727 gallons of milk were converted into butter for a yield of 738 lb.; 370 gallons gave 384 lb. of cheese; and 508 gallons were supplied to the dining-hall. The increase in the dairy herd comprised two purebred Jerseys and seven grades. We disposed of one Ayrshire and one Jersey bull. Attention may be called to the large yield by the Ayrshire cow Lavina of Glen Elgin, the record of which appears elsewhere in the present issue of the *Journal;* this cow was fed on natural grasses only. The average number of cows milked daily was fifty-six.

Piggery.—Natural increase for the month comprised fourteen purebred Berkshires, eight boars and six sows. We sold during the month ten Berkshire boars, six Berkshire gilts, one Middle Yorkshire boar, one Middle Yorkshire sow, and one grade Berkshire sow, also ten mixed weaners. A good demand exists for purebred pigs, but Berkshires are principally inquired for. The animals sold have been sent to various parts of the State, both North and South Queensland.

Mechanical Department.—Work has been continued on the poultry yards. The quarters provided for the working men, stables, and shed at orchard have been painted. Horseshoeing and usual repairs to implements, &c., have been carried out. Four pig paddocks are now in course of construction.

PROTECTION AGAINST MOSQUITOES.

The *Gazette Coloniale* gives the following directions for protecting oneself from mosquito bites, and from consequent malarial fever:—

Close all apertures of the house, even to the keyholes with wire-gauze, and do not move out of the house after sundown without a veil round the hat and gloves so thick that the dart of the mosquito cannot pass through it. Burn insecticide pastilles in the house, anoint the face, neck, and hands with menthol, camphor, or turpentine. Swab up all small patches of water, and pour a certain quantity of petroleum on the surface of the larger waterholes. If these precautions are used, it is easy to avoid the terrible swamp fever.

Seeing that there are thousands of men, women, and children in this mosquito-ridden State of Queensland who live all the year round in the bush, many in the neighbourhood of swamps, in slab and bark huts where the slabs are far enough apart to allow of the passage of the hearth-loving black snake, and of the bread-pilfering 'possum, that hundreds live in tents, that other hundreds are nightly camping on the banks of creeks, swamps, and waterholes, which localities they are careful to select for the night's lodging, and that then thousands are nightly bitten by millions of mosquitoes, without any evil resulting but a blotched face, often not that, we can only come to the conclusion that the Queensland mosquito is a different kind to the mosquito of the Pontine Marshes, in Italy, which is so deadly that the wonder is that the swampy parts of Italy were not depopulated in the time of Romulus. If a Queensland shearer or bushman were asked to smear his face with oil, fence in his hut with wire-gauze, and wear gloves an inch thick, the answer would probably be garnished with profane ribaldry.

Dairying.

IRISH *V.* DANISH BUTTER.

A novel competition is being entered into by Irish and Danish butter-makers. The Irish manufacturers have been doing their best to oust the Danes from their position, and so confident are they of success that the merchants have arranged to provide fifty kegs of butter to be sent from each country to be tested by English experts. The butter will go to five different ports, in order to get as many representative opinions as possible. A standard of quality is to be fixed, and for every keg that fails to come up to that standard the country to which it belongs will forfeit £10 to the opposite party.

SORGHUM FOR STOCK.

Much has been written about the danger of allowing farm stock to graze on young sorghum, and it has been abundantly proved that the risk of sorghum-poisoning is great. But, according to a bulletin issued from the Experiment Station, Manhattan, Kansas, on "What shall we Feed?" it appears that sorghum, Kafir corn, cow pea, and alfalfa (lucerne) make safe pasture after cattle become accustomed to them, but great care must be used in starting stock on such pastures. At the college at Manhattan, the cattle are first filled with straw or hay in the morning. Then they are turned onto the sorghum or other green crops for only fifteen minutes the first day, the next day thirty minutes, and then the time is increased fifteen minutes each day till an hour and a-half is reached, when it is safe to let them stay on all the time and not give them any other feed. Cattle turned on such pastures at first, if hungry, will often eat a few mouthfuls and die in a few minutes or hours.

Here is a wrinkle for farmers in this State whose cattle have died from sorghum-poisoning. Possibly they may think it too much trouble to send them out for fifteen minutes and then turn them out, and to continue timing their feeding for several days; but surely it is better to do this than to let the animals die or make no use of a crop of good forage.

THE ELAND FOR WESTERN DISTRICTS OF NEW SOUTH WALES AND CENTRAL AUSTRALIA.

We have received from Mr. O. McMaster, of Bonnie Downs Station, North Queensland, a most comprehensive and highly interesting pamphlet under the above title by Mr. C. A. Benbow. The pamphlet is too long for our limited space, much as we should like to publish it.

After describing the country between the Overflow and the Bogan River, the writer points out the hopelessness of successful cattle-raising on the scrub-covered country, and he asks how it is to be used when neither fire nor water will eradicate the dense scrub, and supplies the answer, which is: Put an animal on the scrub lands which will eat it, whose natural food it is, who will fatten on it, that requires not much water, and can travel for what it wants. Can such an animal be found? he asks. Yes, the Eland, he says. This antelope, when full-grown, is as large as a two-year-old shorthorn, and has far more the appearance of a high-bred bullock than an antelope. It can live on the hardest fare, and soon grows fat on good pasture. But, best of all, it becomes quite tame, and is easily acclimatised. Mr. Benbow quotes an instance from "Beeton's Book of Household Management," of Viscount Hill, at Hawkestone Park, Salop, having

killed an eland from his park for the table. It weighed 1,176 lb., was as huge as a shorthorn, but with bone not half the size. It was tried in every shape of joint—roasted, boiled, braised—and the verdict was that a new meat of surpassing value had been added to the products of the English park.

In Africa it feeds on various kinds of acacia, and on the "Kanna," which is just our salt bush. They prefer bush of every sort, even eating the bitter aloe.

The writer then gives an extract of a letter from Mr. J. H. Maiden, Director of the Botanical Gardens, Sydney, showing the affinities between the Cape and Australian floras, proving that Nature has prepared our lands for this animal, which would doubtless have been here had it been able to cross the seas. The same climate, its own food, no natural enemies in large carnivora like the lion—what noble herds there would have been to welcome the first settler.* As for disease, it had none until disease was imported.

Mr. Griffiths, for sixteen years manager of Nymagee Station of 128,000 acres, stated that £17,700 had been fruitlessly spent in scrubbing that station. Suppose half that sum had been spent in stocking with elands, what would be the value of that property now?

Suppose all or half the money that had been spent upon trying to acclimatise the salmon had been spent in bringing the eland to Australia, we should have herds here now that would have converted our scrubby Western lands into a reproductive region.

The animal, like the goat, may have a trick of pawing its foods to break down thorns; if so, it may eat the prickly pear, as well as the prickly wattle, which contains much water, which, in Africa, it obtains by eating the spekboom, a plant of the pig-weed class of vegetation.

The pamphlet concludes with a long list of plants common to South Africa and Australia. It would be well if some wealthy, enterprising, patriotic persons interested in the Australian meat supply would make a commencement of introducing this valuable animal. It would be no experiment, for the conditions of life in the west of Australia are practically identical with those of its own African home. Our illustration is taken from Mr. Benbow's pamphlet.

A GENERAL PIG REMEDY.

While a sick pig is generally hard to cure, and there are many remedies prescribed for hog ailments, I have only one remedy for a sick pig, and it is a very simple one. Rheumatism, paralysis, blind staggers, thumps, scours, &c., I treat all alike, though in varying proportions. My cure-all or panacea is nothing more than fresh new milk and turpentine. For a young pig—say six weeks—I administer a teaspoonful of turpentine in, say, half-a-pint of milk. Unless the pig is very sick, it will readily drink this. If too far gone to drink, it must be administered with a spoon. An older pig, however, will seldom refuse new milk, even when a table-spoonful is given in a quart or more. I always keep a supply of turpentine on hand, and, when there is anything wrong with the pigs, at once give a dose of turpentine and new milk. It is the best remedy I know of for all the ills that pigs are heir to. Grade the dose from a teaspoonful for a six-weeks-old to a tablespoonful or more for a mature hog. The milk may be given *ad libitum*, or as much as the pig will take to drink freely.—*Hoard's Dairyman.*

BREEDS OF PIGS COMPARED.

With the object of testing the relative merits of a number of leading breeds of pigs for the production of baconers suitable for the British markets, an experiment was conducted last year in connection with the Ontario

* Probably had the eland been able to cross, the lion would have also been here to welcome the settlers.—Ed. *Q.A.J.*

Agricultural College. The main purpose was to compare the breeds of swine (1) with regard to their relative economy of production, and (2) with regard to their suitability for the export bacon trade.

Six animals of each of the Large York, Tamworth, Berkshire, Chester White, Poland China, and Duroc Jersey breeds were employed. The pigs were fed upon various combinations of Indian corn, wheat, middlings, and barley, and were from ten to twelve weeks old. At the outset they were given a small allowance of skim milk, in addition to the mash already specified, but, as the supply of this skim milk was the same for all breeds, it was not taken into consideration in working out the results. Briefly put, the net outcome was as under:—

AVERAGE DAILY GAIN PER PIG.

	Lb.
Yorkshire	·93
Duroc Jersey	·88
Berkshire	·80
Poland China	·70
Chester White	·66
Tamworth	·64

Worked out according to the quantities of the different combinations of meal required by the different breeds to produce 100 lb. of gain in weight, the positions were as follows:—

MEAL REQUIRED FOR 100 LB. INCREASE.

	Lb.
Berkshire	409
Yorkshire	422
Duroc Jersey	426
Chester White	433
Tamworth	462
Poland China	474

Similar experiments have been in progress at the college for five years, and during that period the relative positions of the different breeds, with regard to economy of gain, have varied very considerably. For purposes of comparison we reproduce a table showing how they stood in 1899 and 1898, as compared with this year:—

1900.	1899.	1898.
1. Berkshire	Berkshire	Yorkshire
2. Yorkshire	Tamworth	Berkshire
3. Duroc Jersey	Yorkshire	Duroc Jersey
4. Chester White	Chester White	Tamworth
5. Tamworth	Duroc Jersey	Chester White
6. Poland China	Poland China	Poland China

When they came to be slaughtered and tested as regards suitability for the export trade, the Yorkshires, as usual, were an easy first. In his notes upon the experiment, the farm superintendent reports in this connection:—"Yorkshires have again taken the lead as to suitability for export. These pigs have shown a decided advantage in quality over all the breeds in the average of the five experiments. Tamworths, for some unknown reason, did very badly this year; in the average of the five experiments, however, they would rank second in suitability for the export trade. Berkshires made a good show, though some of their sides were faulted for shortness and a common tendency for the fat to arch over the top of the shoulder. They did not, therefore, make ideal sides, and were inferior to the Yorkshires in general suitability for export. Over the five experiments they stand third in point of quality to the Yorkshires and Tamworths for suitability for the British markets. Of the other breeds it may be said that on the whole they proved decidedly unsuitable for the export trade."—*Garden and Field.*

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 31ST OCTOBER, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Annie Laurie	Ayrshire	25 April, 1901	696	3·6	28·06	
Blink ...	,, ...	2 Feb. ,,	568	4·4	27·99	
Bonny ...	,, ...	12 April ,,	510	3·6	20·56	
Isabelle ...	,, ...	7 Sept. ,,	787	3·8	33·49	
Laura ...	,, ...	28 Aug., 1900	516	3·5	20·22	With first calf
Linnet ...	,, ...	7 May, 1901	701	3·6	28·26	
Lavina ...	,, ...	11 Sept. ,,	1,457	3·7	60·37	
Lass ...	,, ...	24 Aug. ,,	708	3·6	28·54	With first calf
Renown ...	,, ...	29 Nov., 1900	364	4·0	16·3	With first calf
Ruby ...	,, ...	9 April, 1901	451	3·8	19·19	With first calf
Connie ...	Jersey	8 Sept., 1900	425	4·6	21·89	
Bell ...	,, ...	15 Sept., 1901	455	5·0	25·48	With first calf
Content ...	,, ...	6 June ,,	462	4·8	24·83	
Carrie ...	,, ...	31 Aug. ,,	675	4·6	34·77	
Effie ...	,, ...	6 Jan. ,,	65	5·9	4·29	Dry, 14-10-01
Evileen ...	,, ...	2 Sept., 1900	620	5·6	38·88	
Olive ...	,, ...	4 July, 1901	212	5·6	13·29	
Stumpy ...	,, ...	27 Aug., 1900	398	5·1	22·73	
Spec ...	,, ...	27 Aug. ,,	555	4·5	27·97	With first calf
Tiny ...	,, ...	5 Oct., 1901	362	4·6	18·65	With first calf
Ivy ...	,, ...	25 Oct. ,,	90	4·5	4·53	
Alice ...	Grade Shorthorn	13 Nov., 1900	245	4·4	12·07	Dry, 30-10-01
Clara ...	,, ,, ...	14 June, 1901	520	3·8	22·13	With first calf
Ginger ...	,, ,, ...	19 Dec., 1900	31	5·0	1·7	Dry, 10-10-01
Princess May	,, ,, ...	25 May, 1901	580	4·3	27·93	With first calf
Poly Red ...	,, ,, ...	21 Feb. ,,	245	4·1	11·25	Dry, 31-10-01
Peggie ...	,, ,, ...	29 May ,,	585	3·8	24·89	
Laurel ...	,, ,, ...	22 Aug. ,,	768	3·7	31·82	
Redmond ...	,, ,, ...	22 Aug. ,,	784	3·9	34·24	
Horney ...	,, ,, ...	22 Sept. ,,	453	4·0	20·29	With first calf
Leopard ...	,, ,, ...	6 Oct. ,,	483	3·7	20·01	
Eva ...	,, ,, ...	26 Oct. ,,	36	3·6	1·45	
Lucy ...	,, ,, ...	8 Sept. ,,	860	3·7	35·63	
Countess ...	Shorthorn ...	18 June ,,	740	3·6	29·83	
Cherry ...	,, ...	11 April ,,	328	3·6	13·22	With first calf
Dott ...	,, ...	31 May ,,	575	4·0	25·76	With first calf
Gladdy ...	,, ...	29 April ,,	532	4·2	25·02	
Guinea ...	,, ...	18 July ,,	751	3·6	30·28	
Lady Vixen	,, ...	13 July ,,	567	3·6	22·86	
Maggie ...	,, ...	20 May ,,	451	4·1	20·70	
May ...	,, ...	16 July ,,	688	3·8	29·38	
Nestor ...	,, ...	3 July ,,	666	3·7	27·59	
Olga ...	,, ...	19 June ,,	412	3·6	16·6	With first calf
Plover ...	,, ...	3 July ,,	375	3·9	16·38	
Queenie ...	,, ...	19 May ,,	601	3·7	24·9	
Roany ...	,, ...	17 Mar. ,,	288	5·0	16·12	With first calf
Rose ...	,, ...	10 April ,,	396	3·8	16·85	With first calf
Violet ...	,, ...	9 Oct. ,,	428	4·0	19·17	
Ada ...	South Coast ...	16 July ,,	692	4·0	31·0	With first calf
Dora ...	,, ,, ...	2 June ,,	470	4·4	23·16	With first calf
Grace ...	,, ,, ...	15 June ,,	453	4·3	21·8	With first calf
Trixey ...	,, ,, ...	4 July ,,	603	4·0	27·01	With first calf
Topsy ...	,, ,, ...	3 Oct. ,,	776	3·8	33·02	With first calf
Lady Rose ...	Guernsey ...	15 April ,,	181	5·0	10·13	With first calf
Damsel ...	Holstein	19 Jan. ,,	574	3·4	21·85	With first calf
Blaze ...	Grade Jersey ...	27 Sept. ,,	450	4·2	21·16	With first calf
Pansy ...	,, ,, ...	28 Oct. ,,	51	4·4	2·51	
Bluey ...	,, ,, ...	10 Oct. ,,	327	3·7	13·55	With first calf
Jeannie ...	Ayrshire Shorth'n	8 Oct. ,,	536	3·6	21·61	With first calf
Molly ...	,, ,,	4 Oct. ,,	567	3·7	23·49	With first calf
Playful ...	Jersey	14 July ,,	452	5·2	26·32	

The herd was fed on natural pasture only.

THE DAIRY HERD.

THE PROPERTY OF THE SCOTTISH AUSTRALIAN INVESTMENT COMPANY, LIMITED, TALGAI WEST, *VIA* HENDON.

RETURNS FROM 1ST TO 31ST OCTOBER, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Lily	Holstein	14 May, 1901	853	4·0	37·87	Heifer in first calf
Jubilee ...	Jersey	19 Nov., 1900	141	4·0	6·25	Dried off, 20-10-1901
Victoria ...	,, ...	21 May, 1901	624	4·5	31·51	
Jean ...	,, ...	30 May ,,	608	4·8	32·93	
Kate ...	,, ...	17 Aug. ,,	588	5·0	33·27	
Duchess ...	Grade Jersey ...	15 Nov., 1900	465	5·0	26·31	
Scarlet ...	,, ...	15 May, 1901	591	3·9	25·56	Heifer in first calf
Goldenspray	,, ...	25 June ,,	854	4·4	42·09	
Favourite ...	South Coast ...	6 May ,,	551	3·8	23·21	Heifer in first calf
Nowra ...	Shorthorn ...	26 Oct., 1900	399	3·9	17·26	Heifer in first calf
Primrose ...	,, ...	6 Feb., 1901	586	4·0	26·00	
Vanity ...	,, ...	3 March ,,	419	4·3	20·08	Heifer in first calf
Dora ...	,, ...	12 March ,,	598	3·8	25·19	
Countess ..	,, ...	15 May ,,	433	4·2	20·75	
Bess	,, ...	27 May ,,	661	3·7	27·03	
Julia ...	,, ...	15 June ,,	659	3·8	27·76	
Edith ...	,, ...	17 June ,,	719	4·0	31·92	Heifer in first calf
Jeannie ...	,, ...	20 June ,,	526	3·9	22·75	Heifer in first calf
Rusty ...	,, ...	17 Aug. ,,	705	4·4	34·74	
Cowslip ...	,, ...	7 Oct. ,,	680	3·4	25·44	
Jessamine ...	Grade Shorthorn	16 Nov., 1900	469	4·6	24·25	
Dolly ...	,, ,, ...	16 Jan., 1901	374	3·6	15·52	
Majestic ...	,, ,, ...	2 March ,,	603	3·8	26·24	
Jupiter ...	,, ,, ..	26 April ,,	431	4·3	20·71	
Nellie ...	,, ,, ...	29 April ,,	417	4·0	18·51	Heifer in first calf
Lizzie ...	,, ,, ...	3 May ,,	418	3·8	17·60	Heifer in first calf
Nessie ...	,, ,, ...	13 May ,,	525	3·6	20·87	Heifer in first calf
Dairymaid ...	,, ,, ...	24 June ,,	635	4·3	30·51	
Bridget ...	,, ,, ...	17 July ,,	628	4·0	27·88	
Midget ...	,, ,, ...	24 Aug. ,,	791	3·9	34·21	
Buttercup ...	,, ,, ...	4 Oct. ,,	798	3·4	29·86	
Milkmaid ...	,, ,, ...	31 Aug. ,,	730	4·1	33·27	
Trimmer ...	Grade Ayrshire	11 Dec., 1900	470	3·6	18·68	
Marjorie ...	,, ,, ...	10 Jan., 1901	493	4·1	22·47	
Mermaid ...	,, ,, ...	23 Jan. ,,	498	3·8	20·98	
Madam ...	,, ,, ...	13 March ,,	588	4·0	26·11	
Emma ...	,, ,, ...	21 March ,,	391	4·1	17·86	
Victory ...	,, ,, ...	6 July ,,	622	4·2	29·13	
Faith ...	,, ,, ...	15 July ,,	760	3·6	30·22	Heifer in first calf
Promise ...	,, ,, ...	26 July ,,	655	4·1	20·73	
Spec ...	,, ,, ...	2 Oct. ,,	728	3·7	29·77	
Madeira ...	,, ,, ...	12 Sept. ,,	790	3·8	33·28	Heifer in first calf

AUBIN DOWLING, Manager.

THE GOAT AS A PEST DESTROYER.

The Angora goats, which the Agricultural Department of New Zealand recently imported from South Australia, are doing well on Somes Island, where they are undergoing quarantine (says the Wellington *Post*). Angora goats are already running in several parts of the colony, and are found to be particularly well suited to rough country. They are very fond of blackberry foliage, briars, &c., and several settlers find them of use in preventing the spread of those pests. There is a considerable demand in New Zealand for the animal, but great difficulty is found in supplying it. The Turks have prohibited their export, and the Government of Cape Colony has placed a heavy export duty upon them. In addition to their value in keeping down blackberry, briars, and other similar pests, the goats give a plentiful supply of rich milk, and from each one between 4 lb. and 6 lb. of mohair, worth from 1s. 4d. to 2s. per lb., can be cut every year. At the present time there are about 4,000,000 Angora goats in Cape Colony.

Poultry.

PREVENTION AND TREATMENT OF FLEAS, LICE, AND MITES.

Infestation is always worse in dirty and neglected runs and roots, and such are a standing danger to more cleanly neighbours. Cleanliness and freedom will always put these pests under a disadvantage—not only cleanliness of the nests, walls, and floor, but also of the ceilings and perches. To suppress these pests the houses should be cleaned down at least twice a year with a wash made of hot lime and soft soap, the ceilings, walls, and nests having a good coating; the wash should be fairly liquid, so as to run into every crack and crevice. To every gallon of lime-wash add ¼ lb. of soft soap, previously dissolved in boiling water. Early spring and autumn are the times for these applications. The perches are best treated with boiling water and soft soap, or with an emulsion of kerosene. It is important that houses should be well built, with as few cracks and crevices as possible, for in such harbours these pests congregate and may escape from any wash used. Special attention should be paid to the nests; they should be frequently cleansed and changed to keep off fleas and other parasites. Neither nest-boxes nor perches should be fixed, relays of each should be at hand, so that they can be changed to ensure complete disinfection. The nest-boxes should be now and then cleaned out, and dressed with hot lime. Either dusting the prepared nests with Persian insect powder (pyrethrum) or putting a little sawdust or sand soaked in naphthaline at the bottom will keep off these depredators. Wood-shavings, or wood wool, in the nests instead of straw, is most beneficial. No lice or fleas will live in it, owing to the aromatic odour given off from the wood. Care, of course, must be taken that the remedies employed do not affect the eggs. Regarding the infestation of the birds themselves, white precipitate seldom fails. The heads and necks of young chicks should be early dressed very sparingly, and repeated when necessary. White precipitate is a strong irritant poison, and needs the greatest care in the use, especially in young chicks. It is best obtained as an ointment from the chemists. Hens selected for sitting should have a small quantity of this ointment rubbed in under the vent, head, and sides, and then well dusted with insect powder (pyrethrum). Sitting hens are greatly tortured by parasites, and their young are often lost by neglect of these simple precautions. Dust baths are the natural remedy for lice and mites, and fowl should never be kept without them. Sand and road dust mixed with a small quantity of paraffin will generally keep the birds free from vermin. In place of paraffin, pyrethrum powder may be used with the dust.—*Tropical Agriculturist*, Colombo.

COTTAGE BEER.

Take a quarter of good sweet wheat bran, and put it into 10 gallons of water, with three handfuls of Mathon hops. Boil all together in the copper until the hops and the bran sink to the bottom, then strain the liquid through a hair-sieve or linen bag into a cooler; when lukewarm, add to it 3 pints of very thick treacle and about ½ lb. of honey; when all is dissolved, pour the whole into a 9-gallon cask, then stir in two tablespoonfuls of brewer's barm. When the fermentation has subsided, bung up the cask. In four days the beer will be fit to drink.

The Orchard.

FRUIT CULTURE AT OUR STATE FARMS.

By S. C. VOLLER.

The opportunity is lways open for growers residing within reach of the State farms to come in from time to time and see for themselves what is being done in the way of fruit culture, and if they like, by a repetition of visits, to note the progress made under our methods of treatment, the style of growth of the various trees, and their capabilities in the way of production. In the important pruning season, such visits are likely to be of particular value to the grower, as he can then witness the work in actual progress, ask all manner of questions, and get all the information it is possible for us to give. But a vast number of people interested in fruitwork cannot possibly visit our State farms, and, with the hope of affording something of both interest and benefit to them, I now desire to present through the *Journal* a few illustrations taken at the time of pruning, and showing certain trees unpruned and pruned, and also conveying to the reader a fair idea of the growth made by these trees, and their general development under our methods of treatment.

These photographs were taken at Westbrook, and it may be stated for the reader's information that most of these trees were planted in 1897, some in 1898.

I think very good growth has been made in the time, especially when it is remembered that the seasons have, on the whole, not been by any means conducive to this result.

The shaping and making up of these trees has been very carefully followed from the start, and to Mr. A. H. Benson is due the chief credit for what has been done, as he had charge of the whole thing for a long time in addition to having laid out the orchard in the first place.

Summer pruning, in addition to a lot of finger-and-thumb work in the spring, has been a strong point with us, and the reader may accept my assurance that the summer work is as important as the winter pruning. With the younger trees it as an absolute necessity, as by it you regulate your growth so as to make the future frame of your tree just what you want it to be.

Useless buds taken off here, good ones in proper positions left there to come up and form the tree, and, later on, these topped to regulate growth, get the proper grades of forks and length of limb, and also to develop buds for future fruiting. This is the process of spring and summer pruning.

The principle followed by both Mr. Benson and myself is to cut back hard on young trees in winter pruning ; this provokes a strong growth (although many growers do not recognise the fact), and out of the number of strong shoots those wanted are left on, all others removed. After this comes the value of the summer pruning, in this way: Suppose a tree cut hard back in winter were allowed to grow at will through the following season, in most cases you would get a rank, lengthy growth which would try to go to the sky almost, and as the sap is always pushing its way to the highest point, and in a sense neglecting the lower wood after its formation, your best buds would be at the top of limbs like young fishing-rods, and the lower buds would be weakest.

But now, what are you going to do with such a growth when you prune next winter? If you prune lightly by taking off the tops, as many people do, your next season's growth will be all up above, and little or no development will occur lower down ; whilst, if you cut back well, you take off the best buds, and reduce yourself to the weaker and undeveloped ones below. What is wanted is summer pruning—cutting back of the strong growths when they have reached a certain length so as to give a nice grade of limb and fork, and when this is done a double good result ensues. Where the topping is done,

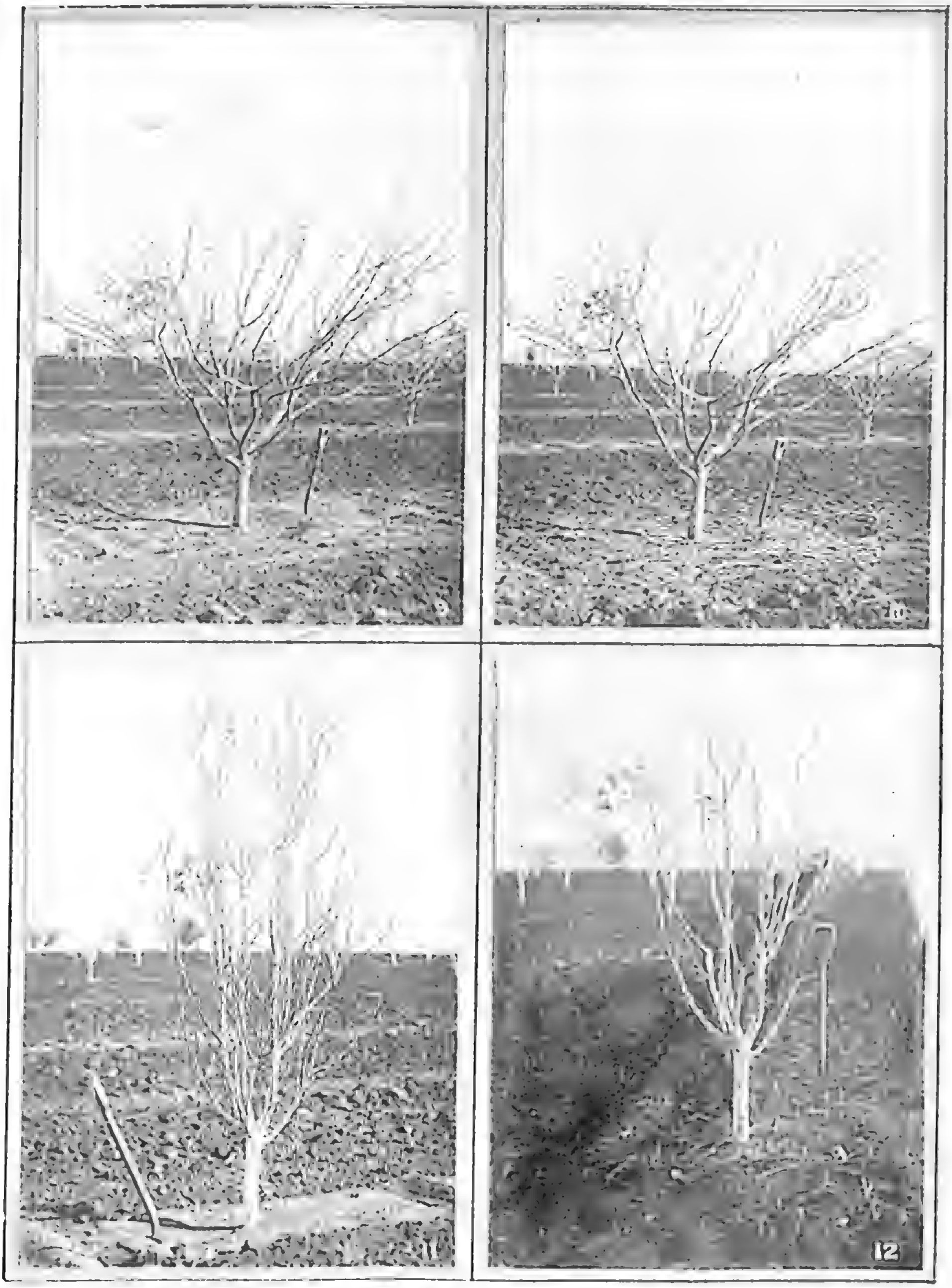
Plate XIX

FRUIT CULTURE AT OUR STATE FARMS.

Plate XX.

FRUIT CULTURE AT OUR STATE FARMS.

Plate XXI.



FRUIT CULTURE AT OUR STATE FARMS.

Plate XXII.

FRUIT CULTURE AT OUR STATE FARMS.

fresh shoots form and the upper ones are allowed to grow, making two limbs or a fresh fork where you would otherwise have had a long rod, and, in addition to this, every bud right down the lower part of your main wood is filled and strengthened so as to come in for future fruitbearing. The idea is to get your tree not only shaped, but established in strength and balance, step by step, from the ground up.

One serious difficulty has to be contended with at Westbrook as on nearly the whole of the Downs country—namely, the effect on the trees of the constant summer winds blowing from the east.

Many people would not readily believe what this means, but to those dealing with the trees it means constant effort in pruning to keep your tree worked back against the wind.

With trees of a certain habit of growth, this is almost impossible.

This is one great argument in favour of short, sturdy trunks as against long-legged or high-grown trees.

Our first illustration (1 and 2) gives a good example of a French prune, both before pruning and after. There are five rows of these trees in this orchard, planted with a view to prove their commercial value here.

They have made good substantial growth, and, taken altogether, are a very pretty lot of trees.

In the unpruned tree may be noticed last year's winter pruning, and above that, near the top, the light forks formed by the summer pruning. Then note the way the buds show up all down the wood. It is not always desirable to prune in the winter above the previous summer work; you may oftentimes do well to go right below that, but you have to consider the general habit and tendency of your tree, the question of the stiffness or elasticity of the wood as the case may be, and the probable effect of the wind on both tree and fruit.

Once trees settle down to steady bearing, their rank growth is checked, and then much of the summer work is unnecessary, for by that time you should have a well formed and balanced tree.

One thing may be said here—that is, that in the pictures some of the trees may appear to some people to be very thickly wooded. That is due simply to the fact that you are looking right through the whole depth of the tree. If you could get to one side, you would find quite a different arrangement of the wood presented to view.

Nos. 3 and 4 represent a plum, "Reine Claude de Bavay," of very fine solid growth, and one of a row which promises a full crop this season. Last year's work is well defined in the unpruned tree, and in the pruned illustration will be noticed the method of reduction of wood.

The summer pruning has not been all cut away, but reduced by taking off one of the forks and cutting back the other. Nos. 5 and 6 show a very pretty plum of the Chickasaw family, presenting a different habit of growth from the last. There is a fair list of this class of plum in the orchard, great bearers, and great growers in their own peculiar way, and they stand a considerable amount of cutting, as a rule, in the winter.

It will be noticed that a fair amount of wood has come out of this tree.

Nos. 7 and 8 bring us to the peaches.

These trees, like all their orchard mates, had a rather hard time last year in the early half of the season, owing to the complete absence of rain; but in the autumn, when the rain came, they tried to make up for lost time, and, by the look of No. 7, succeeded pretty well.

This tree was planted in 1897, and, although not by any means the largest peach-tree we have, is a fair average sample of what our peach-trees have done in the time.

I would like to say here that the bulk of the Downs country can grow as fine a peach as can be produced anywhere—a fruit of high commercial value, and one that, properly produced, would pay handsomely; but the selection of varieties is necessary, as well as good, sound cultivation and careful

methods of pruning, so as to produce high-class fruit, which must be given, and every possible means used against that arch-enemy the fruit fly; then something worth having will be the result.

The great fault of many of our settlers and farmers is that even where they don't grow for market they plant a certain number of trees, which cost money in the first place, and then let them go their own sweet way. This condition of things is just one of the evils I want to combat by this article and these pictures.

"Oh! but," the farmer may say, "you can do all sorts of fine things on the State farms, because you don't consider expense, and you have the Government at your back."

This is a serious error, and I want to assure my readers that we are striving to show that it is possible for the farmer to grow as good quality fruit for his household as we can grow on our farms, and that without excessive cost. But we are trying to do more than that! We are trying to clear the way of difficulties; trying to show how best to combat the various enemies of the fruitgrower—trying to show how to do things better, and so get better results.

From the peaches we go on to the apricots represented by illustrations 9 and 10. These give a fair idea of the growth of our apricots, and are part of a row of Royals which bore a good crop last year, and promise even better this season. These trees have proved their suitability to the conditions of soil and climate on the Downs, and readers of the *Journal* may remember my report of last season on the satisfactory quality of fruit and the prices obtained

In Nos. 11 and 12 we have the Bartlett pear.

No. 13 is another of the same variety, and they give a very good idea of the habit of growth of their class. These trees were very slow in getting into growth, as is the way with pears, but last year they got hold of the ground and went ahead in a surprising way.

No. 11 was a very wayward specimen, and a difficult tree to prune satisfactorily, when future tendency of growth, the constant action of wind, and a few other things were taken into consideration.

I fancy I hear some reader say, "Well, you've murdered that tree, anyhow!"

My reply is that I did just what I thought best, and it is my intention to follow the growth this season, and by a bit of judicious regulating and checking to make that tree what I want it to be; and later on I hope to present to our readers the result in another picture. The fact is that, with the late rains last season, after the long, dry spell, there was a furious top growth, and the tree was distinctly in danger of becoming top heavy—a thing to be avoided when we think of the strong winds.

It has got a severe dressing down, but I think the results will satisfy my critics later on.

No. 13 is put in as showing a better average style of the growth of this class of pear.

No. 12 plate was unfortunately broken, and that will account for the line across the picture.

Nos. 14 and 15 show a pair of a different variety and habit of growth. The wood is very sturdy, shows good bud development, and gives a good idea, in the unpruned specimen, of the arrangement of wood under last year's treatment. The pruned specimen gives further promise of a useful and shapely tree.

No. 16 is a single specimen of the growth of our apples at Westbrook, but, as they were hardly ready for pruning, I have not cut it back at all. However, we have here a good shapely growth on a well-established butt and lower limbs, and, on the whole, a tree which should give a very good account of itself later on.

Our last illustration shows what the olive is doing at Westbrook. These are really very beautiful trees, and have made grand progress, proving that on this country of the Downs they will probably do as well as they will anywhere in the world.

Besides being of value for domestic purposes, and for ornament as well as for breakwinds, the olive has a certain commercial value both for oil and as a pickled fruit, but it is not the purpose of this article to deal with this matter. All I need say here is that the olive has not received the attention it deserves. I hope some day it will. I trust that in the foregoing readers will find something at least to interest them, and if any growers succeed in getting a few ideas to help them I shall be very well satisfied.

STRAWBERRY-GROWING ON THE SOUTH-EAST COAST OF QUEENSLAND.

By JAMES PINK.

During the past few years strawberry-growing in the Wellington Point and Cleveland district has been largely developed. Ten years ago strawberries, like the historical cabbage on the Darling Downs, could not be made to grow at any price; but industry and perseverance have again illustrated what Queensland soil is capable of producing when cultivated by intelligent men. In the course of the present season, more than 50 tons of strawberries have been sent from the above district to the Sydney and Brisbane markets and to the jam factories, and sold at a remunerative price to the growers. In consequence more land is being cleared and broken up to be ready for planting in March, so there is likely to be an even larger output of fruit next season, which usually commences in July and lasts till December. The different varieties coming into bearing one after another makes the fruiting season last out as long as possible.

The finest berries are gathered in the early morning, packed in single rows in cardboard boxes each holding about a pint, and sent out by the first train to their destination, so that they reach the consumer quite fresh. The small and inferior fruit is gathered in wooden kegs, and forwarded to the factory daily, where they are received in quite fresh condition.

This district having proved pre-eminently suitable for strawberry culture, there is little doubt that in a few years it will be able to supply all the strawberries required for jam-making in Australasia. Three tons of berries per acre is quite an ordinary crop, and five tons have been grown in at least one instance this season. The fruiting season is consequently quite a busy time, and "boys who can whistle and girls who can sing" are in great request—in fact, it is the local harvest time, and everybody is busy. Some growers pay by the day, others ½d. per lb. for gathering—a quick hand can gather 1 cwt. per day.

The soil on which the fruit is grown is a red sandy loam, and, according to Dr. Voelcker's report of it, is poor in nitrogen, also in lime, potash, and phosphoric acid; therefore these constituents have to be supplied in the shape of manure. To grow good berries, the land can hardly be too rich, although the strawberry is not an exhausting crop; but there must be plenty of food available for the growing plant, otherwise it will become stunted and the berries small. The following manures have been found to answer well in these soils:—

$$\left.\begin{array}{l}\tfrac{1}{2}\text{ ton bonedust}\\ 1\text{ cwt. kainit}\\ 1\text{ cwt. sulphate of ammonia or nitrate of soda}\end{array}\right\}\text{ per acre;}$$

the bonedust and kainit to be well ploughed in about two months before planting, that it may be available for the young plants so soon as their roots get to work. The reason of this will be plain when it is understood that they can

only take up food in solution, so the manure must have time to change from a chemical to a physical combination, in which state only it can be available to the growing plant. The land should be ploughed as deep as possible. My own practice is to let the plough go twice in the furrow, the second time the nose of the plough being dipped as deep as possible, to bring up a portion of the subsoil; then to sow a part of the manure to be covered in by the next furrow as deep as possible. This will encourage the roots to go down deep into the subsoil, and enable the plants to withstand the dry weather when it comes. The land must be well cultivated and broken up, and the manure thoroughly incorporated with the soil. This being done, the harrow should be run over the surface when dry, to kill the young weeds that will start into growth; and just before harrowing the last time before planting, the sulphate of ammonia or soda should be sown broadcast and harrowed in, when the ground will be ready for the plants. There are various systems of planting, but the following is about the best that can be adopted for field culture. Too much care cannot be taken with the planting, for on that depends, to a great extent, the success of the crop. In the first place, the plants after they are lifted should never be allowed to get dry. While planting, the roots of the young plants should be laid in water in which soil has been mixed to make it about the consistency of whitewash. This will cling to the roots and keep them moist after they are planted, thus enabling the rootlets to start into growth quicker than they would otherwise. The land being prepared, it should be set out ready for planting, in order that the plants may not be kept out of the ground longer than possible. A line should be stretched across the plot where the planting is to be commenced. It is not the best way to plant by the line, but a mark should be drawn by a pointed stick right along by the line; when this is done the line should be moved on to where the next row is to be, and so on, row after row, until the whole ground is set out. The distance between the rows should be 3 feet. The ground being marked out for planting, choose a dull day if possible. The plants being ready in a shady place, bring out a few at a time with their roots submerged in the mud bath. Take a strong handfork, and drive it its full depth and nearly perpendicularly into the soil on the marked line, and thus commence the planting of the first row. The soil should be drawn out, leaving a hole about 4 inches deep. This can be easily and quickly done if the ground has been well cultivated. The soil at the back of the hole where the fork was inserted should be nearly perpendicular; then take the plant in the left hand, and holding it at the back of the hole, the collar of the plant being just level with the surface of the ground, spread out the roots fan-shaped. The hole must be of sufficient depth for the roots to be placed quite straight down. This is of the greatest consequence, for if the roots are doubled up it is impossible for the plant to thrive. The roots must be placed in the most natural position possible. Then, still holding the plant in position with the left hand, replace the soil in the hole, pressing it firmly on to the roots with the hand. Do not hurry with this part of the work, for it is of vital importance that the plants be properly set. Planting the plants and just putting the roots under the soil are two very different matters. The plant being properly fixed, the soil should be levelled round it in a workmanlike manner. The plants should be 1 foot apart in the row, and the rows 3 feet between. The following are the principal varieties grown in the district:—

Marguerite.—Fruit large, conical, flesh white; a very showy fruit and a heavy cropper, but of poor flavour, and the plant is very subject to the leaf disease (*Sphærella fragariæ*). ;

Trollope's Victoria. — Fruit large, roundish-ovate, skin light-crimson a great bearer, lasting longer in fruit than any other strawberry, and will give greater returns than any other variety. Nearly free from disease.

Federator.—A strong growing variety, does best on a clay soil; fruit round and large, sometimes cockscomb-shape and very large, flesh white, and when quite ripe of good flavour. Travels well.

Pink's Prolific.—Belongs to the old Elton pine family; when well-grown the fruit is large, deep scarlet right through, and of fine flavour. Should be planted annually, and does better in a sandy soil than most strawberries.

Royal Sovereign.—A very fine bright scarlet berry of good flavour; very subject to disease.

Laston's Noble.—Fruit large and early; but so far has not proved of much value.

Many other named varieties are on trial; also several thousands of seedlings, which have fruited for the first time this season. Among them are several varieties of great promise; these will be further tested and proved, and their character fixed during the next season, so that as strawberry culture develops our growers will have new and improved varieties that will give greater returns than any at present known.

Raising plants from seed is the only means of obtaining new and improved varieties of fruit. The most likely way to accomplish this is to cross-fertilise the flowers by hand, though good results may be obtained by sowing seed from the largest and handsomest fruits. This is sure to produce some plants that will bear fruit equal to that from which the seed was taken, for like brings forth like all through creation. Nevertheless, raising new seedlings by hybridising or cross-breeding is the surest way to succeed. The operation in itself is very simple, but the operator must be endowed with patience, and possess a certain amount of technical knowledge. The following is the usual method by which it is carried out:—Having decided on the varieties to be crossed and which is to be the male parent and which the female or mother parent, the two kinds should be planted near each other, so that the pollen can be quickly conveyed from one flower to the other. The plants should be strong and healthy—never breed from diseased plants. A little management will be required to bring the two parent plants into flower at the same time. The seed-bearing parent should only be allowed to carry three or four fruit; each flower of these should be fertilised with pollen taken from the flower of the male parent. The operator will require a pocket lens and a pair of wire-pincers. As soon as the flowers on the future seed-bearing parent open and before self-fertilisation can take place, he will remove the stamens by means of the pincers. With the lens, he will observe the maturity of the pollen and the condition of the stigma; then as soon as the pollen on the stamens of the male parent is in a fit state he will—with the pincers—remove those stamens and apply their dust-like pollen to the stigma of the flowers of the seed-bearing parent, and the operation is complete. The seed-bearing plant should be covered with a piece of mosquito-net before any flowers open, and remain covered till the fruit is set. This will prevent flies or bees operating on the flowers. The seed-bearing plant should be watched and attended to as its requirements may need to keep it strong and healthy, and to protect the fruit from slugs and birds. Allow the fruit to ripen well before removing it from the plant; then let it remain in a warm, open place for a day or two, when the seeds should be sown in soil composed of one part loam, one part sand, and one part very rotten leaf mould or stable manure passed through a sieve. Well drain some pots or seed-pans and fill them with the soil, press it down firm with the hand, and it is then ready for the seed. The seed is more or less embedded on the outside of the fruit. When about to sow the seed, take the fruit in the left hand, and with a knife pare off the skin containing the seeds and drop it into a cup of water. Break up the skin in this, well separating the seeds. Then pass the water containing the seeds on to the soil prepared for them, and see that the seeds are evenly spread over the surface. Stand the pots in a shady place, and the seeds will begin to grow in a few days. They should be treated the same as any other seedlings, and will be ready for planting out in their permanent place in March. They will fruit the first season.

In field culture move the ground between the rows with a horse hoe, care being taken not to throw the soil over the plants. For hoeing the ground between the plants, a Dutch hoe is best. The weeds should never be allowed to get a start. After the plants are established they should be mulched sufficiently to keep the fruit clean, and this is best done by laying some grass round the plants and about 1 foot wide, leaving 2 feet clear between the rows to be cultivated with the horse hoe all through the season, so that the air may permeate the soil freely, carrying with it the elements of water and allowing every shower of rain to soak into the earth. By keeping the surface soil moved, it acts as a mulch by preventing evaporation.

The strawberry is as much a poor man's fruit as the rich man's. It will grow as well on a small allotment as in a 10-acre field. Few allotments are so small but that a perch or two could be spared for a bed, and so nearly every working man—no matter whether he gets his living with a pick and shovel, a pen, or a bodkin—could grow a few strawberries for his home use. I saw a garden of this kind a few days ago; it was in a 16-perch allotment. The owner had trenched, manured, and planted about 2 perches at the lower end, and the plants were carrying a crop of fine fruit. At the end between each row one stock had been planted, and these were just in their prime. The man and his wife showed me their little garden with pardonable pride; the good wife said she had more fruit than she could use, and so had been able to send some to a neighbour's sick child. I felt like the old Yankee and "thanked Providence that there was at least one spot not devoted to the almighty dollar."

For garden culture, the plants could be put closer than in the field; 1 foot by 18 inches would be sufficient, and they should be allowed to remain only one season. When one crop of fruit is done, the plants should be dug in, the ground well manured and got ready for planting the following March. This may go on for years on the same piece of ground, provided the old plants are dug in and a little manure added each year. The strawberry crop is not an exhausting one to land.

RHUBARB WINE.

Ingredients for 1 gallon of wine:—6 lb. of rhubarb stalks; cut it is lengths of 2 inches, add to this quantity 1 gallon of cold water, place it in a tub or vessel where it can remain six days, stir it up well two or three timen each day, then strain it off into another tub or vessel, and add 1 lemon, sliced very thinly, and 4 lb. of loaf sugar. Stir the mixture altogether until the sugar is quite dissolved. Allow it to remain undisturbed for ten days.

Do not disturb the sediment; strain off the liquor through a piece of muslin doubled. Pour all into a clean cask, and add ¼ oz. of isinglass—not gelatine—which has been previously dissolved in a tablespoonful of boiling water.

When it has been kept six months, pour the liquor gently from the cask through a wine funnel—an ordinary funnel, however, will do—place a piece of muslin over the mouth of the funnel to prevent any substance passing. Draw off into bottles, in which a lump of sugar has previously been placed.

After allowing the wine to keep for twelve months, it will be found quite equal to many of the imported wines.

If by choice it is required the wine should sparkle, lay the bottles down, and when drawn the wine will pour out like champagne; if placed upright, the wine will be still.

Great care must be taken when bottling off the wine that there shall be no isinglass or any other sediment from the cask.

Viticulture.

AN EXPERIMENT IN AUTUMN GRAFTING.

BY E. H. RAINFORD, Viticulturist.

As most fruitgrowers are aware, many varieties of deciduous fruit trees can be budded in the autumn, with the result that, although union takes place, the bud remains dormant through the winter, breaking in the spring with other buds. If a similar system of grafting could be successfully established for vines, it would be a boon to vignerons, as spring grafting generally comes on at a time when many other matters claim their attention, and, besides, those buds that take delay starting so long that the powerful rays of a November sun frequently wither the young, tender shoots, which are also a prey to many voracious insects. Moreover, if the spring graft fails, a year is lost, whereas if the autumn graft failed it would be possible to regraft in the following spring, and the season be saved.

With the view then of testing the possibility of autumn grafting in Queensland, the writer made the following preliminary experiment:—

On 3rd April, seven vines were grafted at the Westbrook Experimental Farm in the usual cleft-graft manner. Four were Black Hermitage scions on Mataro stocks, these being odd vines in a row of Black Hermitage, and three were Morocco Prince scions on Mauzac (White Solferino) stocks.

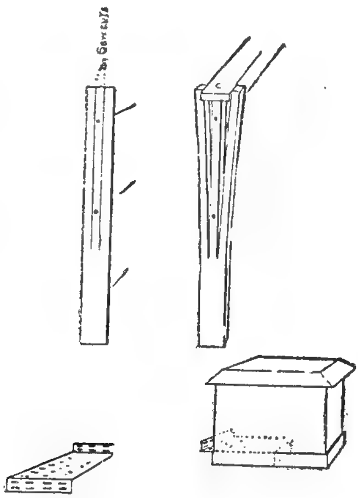
A week later, four Isabella stocks were grafted in the same manner with Calabrese and Raisin de Dames scions. The vines, although on full leaf, were in a quiescent state, as there was no flow of sap from the stocks when they were decapitated. The grafts were examined at intervals through the winter, but only in one or two cases was there any apparent beginning of a union, and the experiment was looked upon as a failure, and no further care taken of the grafts. To the writer's astonishment, when passing through the vines to summer prune, he found some of the grafts had made vigorous shoots as forward as any in the vineyard. An investigation of all the grafted vines showed the following results:—Of the four Black Hermitage grafts, one had made a perfect union, and was growing vigorously; two had been trodden on by men engaged in trellising operations; and the fourth, although trodden out of position, had made a union, and was starting fairly well. Of the three Morocco Prince grafts, one had made a splendid union, and was growing vigorously; the second had made a poor union, and was very weak; the third had failed. It must be mentioned that the Mauzac stocks were very hard cases, and in no instance was a good, straight split obtainable. Of the four grafts on the Isabellas, two had made a good union, one had failed, and one was not to be found; the scions having been, apparently, trodden out. Out of eleven grafts then, six had taken, three had been accidentally injured, and two had failed. Even had only the six taken, it proves that autumn grafting is a possibility, and, with further experience, there should be as good a percentage of takes as in ordinary spring grafting. It certainly opens up a field for vignerons with a taste for experimental work, and the results obtained would be gladly received by the writer, who intends to follow up the experiment on a larger scale next autumn, if all goes well. It is evident that the vines must be fairly dormant when grafted, otherwise the scions would start an autumn growth, which would be nipped and possibly killed by the winter frosts or cold winds.

Apiculture.

A SIMPLE FIXED FRAME AND AN IMPROVED BOTTOM BOARD.

By H. R. STEPHENS, Toowoomba Apiaries.

The frame here described may be said to occupy a position, as regards merit, between the ordinary plain frame and the Hofman, which latter is the style of fixed frame now generally used. The means adopted to make the Rusel frame self-spacing, and to obtain the projections on the end bars necessary for that purpose, are to make two saw cuts down an ordinary end bar about three-quarters of its length and spread the two outside strips so as to grip the top bar, the centre strip being driven into a five-sixteenth hole bored in the top bar. The sketch will explain.



As regards the bottom board of a beehive, your readers are perhaps aware that the ordinary form consists of a plain board cleated at each end, and with two strips nailed on the side edges to raise the body of the hive and thus form the entrance for bees. In Rusel's Improved Bottom Board, the plan is generally the same, with the exception of about 8 inches at the front, where the board is another bee-space lower, making the whole entrance ¾-inch deep, and dividing this opening midway is a piece of bee zinc, which slides in grooves, and when pushed in forms a Queen and Drone Excluder, and when drawn out an inch or so acts as an ordinary entrance for bees.

SPRAYING BEES TO HIVE THEM.

A correspondent of *Garden and Field* writes to that journal:—

I do not know a great deal about bees practically, but I have been stung by them since I was a boy, and that is a long time ago. The first swarm I helped to take was from a white gum-tree we had cut down. I have hived a

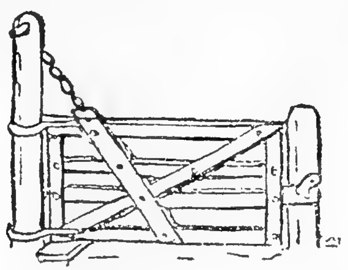
few swarms at times since, and last year, when one gave me bother, I got a big garden syringe with a fine rose, and gave them some water with good results. Curiously enough, this week I came across the following in the *American Agriculturist* on the same subject, and, as this is the swarming time of the year, perhaps it may be of value to some of the readers of *Garden and Field*, so I send it along as my share to the mutual benefit paper. It is by F. G. Herman, New Jersey, and he says:—

In hiving swarms it often happens that the bees are persistent in taking wing, when they are dumped in front of their new hive, instead of crawling into it. I have had a few swarms go back and cluster on the same limb after they had been carried to the hive two and three times. I recently tried a little spraying on a few swarms to overcome this difficulty, and with very good results. While the bees are yet hanging on the tree take a small spray pump or syringe, and wet the cluster with one or two quarts of cold water.

Then take your swarm-catcher, run it up under the cluster, get them into it, and they will cling together while you carry them to the hive. When dumped in front of it, they will not readily take wing, but will run into it. Swarms that have been hived a few hours and seem restless, or cluster mostly on the outside of their hive, can also be made more comfortable by giving them a little spraying. Bees need a great quantity of water during summer, and the beekeeper can supply their needs in a few minutes, where it would require hours for the bees to gather it themselves.

A SELF-CLOSING GATE.

Take an ordinary gate and attach hinges as shown (to be made from old wagon or buggy tire), so that the same will work easily on the post. Then



attach trace chain at brace, and also to post on reverse side from gate. By opening the gate the chain is wound round the post, raising the gate about 8 inches. It will close by its own weight. The hinges are cheaply and easily made and attached, using only two small bolts on each. If people will adopt this hinge and method of swinging a gate they will have no further trouble by having gates left open. I have used three now for four years (writes a correspondent of *Farm and Ranch*), and have had no trouble. Before it was nearly impossible for me to keep them closed. The gate is suspended by the chain, and the brace is for the purpose of letting the weight come on all four slats, and should be about 18 inches from the rear of the gate.

Horticulture

HOW TO GROW DAHLIAS.

BY W. SOUTTER, Inspector of State Farms.

The dahlia was imported into England from Spain by the Marchioness of Bute in 1789. The plant was originally a native of Mexico.

The dahlia of the gardens to-day is, of course, much different to that of the original species. The gardener is responsible for the endless number of varieties that are now to be found in cultivation. The dahlia may be divided into four distinct classes—namely, Show, Fancy, Cactus, and Pom-pom varieties. Of each class there are numerous variations, both in the habit of growth, form of flower, and arrangement in colour.

Characteristics of a Show Flower.—Viewed from the front, the flower should be a perfect circle; the petals thick and stiff, smooth on the edges, and round and broad at the ends, slightly cupped, not showing the under surface. The rows should be regular, each forming a perfect circle with no spaces between; petals uniform in size, of same shape; and there should be no crumpled appearance.

Viewed from the side, the bloom should form two-thirds of a ball. The petals should rise one above the other in regular rows and form a perfect imbrication like scales on a fish, only curved inwards at the edges.

The centre, to be perfect, should have the unexpanded petals lying with their points towards the highest point of the flower, meeting regularly at the apex.

Fancy dahlias closely resemble the show class, and should possess all the characteristics of that section, except in the matter of colouring; the show sorts being all self colours, while the fancy are striped, blotched, mottled, and parti-coloured.

Pom-poms.—This beautiful little group of dahlias should possess all the qualities of their larger growing brethren both as regards form and colour.

Cactus Dahlias.—As a florist's flower, this class is head and shoulders above either of the above sorts. The cricket-ball form is entirely lost in this group, the flower consisting of large irregular-shaped petals of almost every shade of colour and diversity of form. Some possess only a single ray of petals; others, semi-double, while some are quite double, although flat in form.

Having thus briefly described the flowers, let us for a moment attend to the cultural side of the dahlia.

The ground in which the dahlia loves to grow is a nice friable loam, enriched with well-rotted dung, with an admixture of decomposed vegetable matter, as leaf-mould, decayed turf, or even straw. Manure or matter of any kind should never be applied to the growing plants while in a ferment stage, as rapidly-decomposing matter is fatal to the young roots by contact.

The land should be deeply worked—say 18 inches deep, 6 inches of rotted manure put on top, and dug in a spit deep. It is always preferable to have the ground prepared some time prior to planting; the ground should be well drained, and, if a clayey subsoil obtains, a free admixture of coal ashes will improve conditions.

When planting, do not place the tubers too deep—2 inches of soil over the crown will be ample. Should dry weather obtain when planting, water liberally and mulch with straw or grass.

If strong crowns have been planted, it will be found that a number of shoots will appear; remove all the weak ones, leaving two or three at the most. As these continue to grow, keep them tied to a good stout stake. If this is neglected they will be sure to break, as the stems are very brittle. Never let the plants suffer from want of water; and an occasional drench of manure water will be beneficial. As the plants start to show flower buds, a judicious thinning out is necessary, especially if flowers are grown for exhibition purposes. The primary blooms are usually the best, although good blooms may be had on the secondary laterals. The plants are much benefited by cutting the looms when matured.

After the flowering season is over, the plants will begin to look a bit shabby, and you feel tempted to cut them down; but if you wish for good tubers, don't do so; allow all the sap to return back to the rootstock before you use the knife. Dahlias are propagated by division of the roots, and in all cases of division a portion of the main crown should be attached. A tuber without a crown bud will more often rot than grow. Plants are easily raised by means of cuttings, which root most readily. Cuttings may be had of the young shoots springing from the crown, shortly after they begin to spring up, or from short lateral growths on the main stems. Sandy compost is best for striking purposes, and pots or pans are the best receptacles.

The roots of old plants may be lifted at the end of summer and stored in a dry place till the following spring. The time for planting extends from October to January. Cactus dahlias are frequently raised from seed, and numerous interesting varieties are thereby secured, and the best ones can always be perpetuated by means of tubers.

There is one dahlia which I regret to say is seldom seen nowadays, but which is well worth a place in the garden. I refer to *Dahlia imperialis.* In favoured soil and localities, it will grow to a height of 10 feet and produce an abundance of handsome pendulous blooms of pale lavender colour. The roots of this variety may be left in the ground undisturbed, adding annually a liberal manuring.

CHRYSANTHEMUMS.

By W. SOUTTER, Inspector of State Farms.

The chrysanthemum being one of our chief autumn flowers, and one which on account of its extreme hardiness is now common in most gardens, is a favourite with most people. There are few plants that respond so readily to liberal treatment as does the chrysanthemum. Of late years the rage has been to produce blooms of great size at the expense of number. These monster show blooms are right enough on the stage at a show, but most people will agree with me that for decorative purposes the small and medium blooms commend themselves to the decoration of the table and drawing-room.

The chrysanthemum, whose variety is legion, can be grown in almost any part of Queensland, provided it can be supplied with a liberal watering during the growing period. Yet, under special conditions, it will flourish and produce better blooms.

The amateur who secures a chrysanthemum for his garden invariably sticks it into some corner, and leaves the rest to Nature. It grows on from year to year until it covers a patch of ground half-a-yard square. He gets a prolific crop of small flowers in the autumn, and is quite contented.

But the amateur who "enthuses" over the chrysanthemum adopts a different method. He gets a plant and takes every care to hasten and develop its growth; he feeds, waters, prunes, disbuds, and keeps it tied to stakes; and when the blooms emerge from the calyx, he shades them from the fierce sun.

His system is something as follows: Plant a single pip or sucker in land that has been thoroughly dug and heavily manured, well-drained, and thoroughly well pulverised. If the soil be clayey, he adds a few barrow-loads of sand or coal ashes, or, better still, if procurable, oyster-shells pounded up. Broken coral is also beneficial. The additicn of bonedust sets the plants moving. As soon as growth commences, manure water is applied twice a week, with liberal waterings every day. When the shoots are 6 inches high, the tip is pinched off; this makes the plant branch out. Allow three or four of these to grow to a length of, say, 8 inches, and then remove the tip to encourage lateral growth. On these laterals the flowers will be formed, and if exhibition blooms are wanted the buds must be thinned out, leaving the terminal buds to develop. If medium blooms are desired, take the terminals out and leave the secondary, merely removing buds where there are two or more close together.

A careful eye has to be kept on the general growth of the plant all the while, to prevent too much growth of wood. Remove all young shoots that may appear anywhere below the flower shoots, being careful to leave sufficient foliage to sustain the plant in perfect health, always remembering that the leaves of all plants play a very important part in their breathing and evaporative functions.

Never allow a chrysanthemum to suffer for want of water, for, if once the leaves are allowed to flag, a percentage of the respiratory organs becomes impaired and the general system of the plant must suffer.

The wood of the chrysanthemum being very brittle, a good stout stake should be furnished to tie the stems to; tie firmly, with some soft material to prevent abrasion of the bark.

When the flowering season is over, and the plants begin to look shabby, they may be cut down level with the ground. Fork around the roots, and add a good mulch and let the plants remain till the next planting season, which extends from October to January. If the grower has no room to keep his plants in the ground where he flowered them, he can lift after flowering and plant in a close row in some spare piece of ground, but not under trees.

It is just 137 years ago since the first plant of *Chrysanthemum sinense* was imported into England by Mr. Fortune, from China. From this importation have sprung all the lovely varieties that now embellish our gardens with their grotesque beauty of form and their generally attractive hues of colour.

About the same time, Mr. Fortune imported the *Chusan daisy*, from which the gardener has evolved the many Pompom varieties, with their pretty miniature blooms. Every year new varieties of chrysanthemums are being added to the already comprehensive list by enthusiasts, who raise seed variations by the hundred.

Chrysanthemums are divided into groups according to their general characteristics, as: Incurved—petals turned inwards; reflexed—petals turned outwards; interlaced — petals both inwards, outwards, and crosswise; anemone—flowered, petals quilled like an aster, Japanese—petals large and irregular in shape, often parti-coloured; Pompom—petals nearly always erect, and many flowered.

POTTING OF PLANTS.

If new pots are to be used, be sure and soak them for several hours first, for unless the pottery has been well moistened it will suck out all moisture from the soil. Old pots are as good and even better than new, but they should be well washed inside and out before using again. Warm soapsuds, with a tablespoonful of washing soda dissolved in it, will wash the most soiled pot as clean as a new one. Fresh soil is the best for plants, and that which is obtained from under the stiff, wiry, sharp-looking grass is very fine for use. Such tufts, when well rotted, make the best composts to mix with garden loam, leaf mould, &c. A little sand is needed for nearly all plants, as it keeps the soil light and lets

the roots extend freely. Leaf mould should be prepared by every gardener by gathering the autumn leaves and piling them in a heap to decay. It is well to throw a little soil over them to prevent them from blowing away. In eighteen months they are ready to use. Thoroughly decayed cow manure is also needful for healthful growth, and that collected in dry cakes in pastures piled up but kept dry for twelve months is exactly to our purpose. Little bits of charcoal and coarse gravel are of great use in preparing compost and potting plants. Put some bits of charcoal into the bottom of the pot, then a little fine straw or moss, and now add an equal mixture of loam leaf mould or cow manure and a sprinkling of sandy gravel. Shake this down well, wet it a little, and put in the plant, spreading out the roots as evenly as possible. Add more compost by degrees, pressing it firmly about the roots; do this till the pot is nearly full. Sprinkle the whole surface of the leaves and shade for two or three days. For repotting give the earth in the pot a good wetting, then run a knife around the edge and spread the fingers of the left hand over the soil; with the other hand turn the pot topsy-turvy, and a ball of earth will drop into your hand. If it does not fall out directly strike the edge of the pot against some hard substance and it will drop. Disentangle the fibres of the root at or near bottom, and set the plant firmly into a pot one or two sizes larger with a little charcoal and rich earth at the bottom of it. Water well and shade for a few days. Give also a top dressing of fresh soil if needed, and your plants will repay the care. As a general rule pots from 4 inches to 7 inches are large enough. Plants will often flower better if the root is bound a little. This is especially the case with double geraniums. Give careful culture, keep them clean, well watered, properly ventilated, and well fed, and you will never regret the care expended upon them.—*Tropical Agriculturist, Colombo.*

A NEW AND ECONOMICAL METHOD OF STACK COVERING.

Just at the right moment we have received from Mr. E. R. Baker the following description of a new stack cover, the advantages of which will be obvious to all farmers. As the building of stacks is now being proceeded with, we recommend wheat farmers to look into this matter of covering, as the thatching of stacks is a thing which ought not to be neglected:—

Purchase two rolls of 4-ply building paper, each roll 336 feet long by 3 feet wide, at 38s. per roll. Cut the two rolls into 16 pieces 42 feet long; mark a line with white paint at right angles across the middle of each piece at 21 feet from the ends; finish off the ends with a 3-feet piece of hardwood batten on each side, screwed or nailed together with the ends of building paper between; bore a ½-inch hole through the battens at 3 inches from the ends, into each of which fix a wire loop 6 inches or 8 inches long; then roll each piece up from each end to the white line, and put a tie round it. These 16 pieces so prepared will cover a stack measuring 44 feet by 24 feet. The stack can be built to any height, with the ends carried up perpendicularly, and the sides of the top shaped to a roof. When ready, pass up the first piece to a man on top with a rope, who will lay the white line straight with the ridge of the stack, cut the tie, and let the battened ends of the piece fall down on each side. Each of the 16 pieces will be put on in this way, giving each a lap of 3 inches. When the 16 pieces are all laid on in the manner described, take hardwood pointed stack spars 3 feet long, pass one through each two wire loops, and drive well home into the stack.

If this is well done, the stack will be covered wind and water tight at a small cost. When opening the stack, take the last piece put on off first, rolling up from each end to centre ridge-line; put a tie round it, and pass down (with a rope), to be put away until required to cover another stack. If care is taken, this building-paper stack cover will last many years.

The paper can be procured in Brisbane at the price above-mentioned.

Tropical Industries.

THE QUEENSLAND RICE INDUSTRY.

By FRED. WM. PEEK, Loganholme.

It is pleasing to note the interest aroused amongst farmers in many parts of Queensland in the rice industry—an industry which consequently will be carried on, at least in the Southern districts, on a much larger scale than has yet been the case in any part of the State.

It is well known that Chinamen in the Northern districts about Cairns and on the rich river flats of the North have successfully cultivated this cereal. At one time (1898) as much as 863 acres were under crop in this State, which returned 38,153 bushels of paddy, or an average of 44·19 bushels to the acre, according to the Registrar-General's report for that year, showing the splendid results and the fertility and suitableness of the soil for rice production; and it is recorded that 2 tons per acre were harvested from an area of 12 acres planted near the Barron River.

The import duty hitherto placed upon rice by this State was ample protection for this industry, and gave a heavy bonus to our local growers, although the cultivation of rice has been seriously neglected by our Southern farmers, chiefly, I might say, owing to ignorance of its qualities, and of its adaptability to the soil and climate until very recently. Rice was looked upon as a tropical product only suitable for our Northern climate instead of being what it really is—a semi-tropical plant. Another deterrent was the assumption that rice could only be grown in standing water or in swamps, and therefore the labour conditions were a drawback, not being to the liking of our farmers who prefer dry-land cropping to paddling about in a swamp ooze, as was thought necessary in growing rice. This want of practical knowledge was then the deterrent, which I am pleased to say is now overcome. By experimenting and planting various kinds and varieties, it has been found that swamps are not necessary for rice culture; that certain varieties, of which there are between 300 and 400, can be grown practically on dry land, the only necessity being sufficient rainfall at the proper time and season. Other varieties again experimented with have certainly grown with a splendid amount of straw, but very little grain, being a variety requiring moisture in a greater degree.

Having taken up this question of rice culture and reorganised the industry in the Logan district, I endeavoured to get information as well as seeds of other varieties to add to the knowledge and practical results we had already obtained. From the "Aus" or upland variety of rice, we had obtained splendid results, which have already been published in these pages. It was, as before stated, of the Aman, or swamp variety, that more information was desired, and I am pleased to be able now to publish the information received per favour of F. G. Sly, Esq., Commissioner of Settlements and Agriculture in the Central Provinces of India. From what he writes I take the following:—

Preparing the Land for Swamp Cultivation.

For rice cultivation a low-lying plot is selected in which water will easily collect, and these plots, varying in size from one-twentieth to three-quarters of an acre, are surrounded by earthern embankments thrown up about 2 feet high and arranged so as to hold back the water. This then is ploughed or worked up until a tilth of fine mud is obtained.

Sowing Seed for Swamp Planting.

The early variety is sown in the beginning of the rainy season (in India this is June, in Southern Queensland this should be about October, and in

Northern Queensland about January) either broadcast or with a sowing drill, preferably with the latter both for evenness and economy.

When the seed (paddy) has germinated and grown to the height of 6 inches it is weeded out by hand. The number of weedings required to keep the crop free from weeds depends upon the nature of the soil and on the fertiliser used; but ordinarily two to three weedings are sufficient. This variety attains maturity in about ninety days.

The fields must always be kept very moist, if not covered with water, standing, say, to a depth of 2 to 3 inches all the time of growth; but when the crop begins to ripen the water should be all drained away.

The late variety is worked slightly different to the early crop. This is sown thickly broadcast in beds prepared as in a nursery, the ground prepared being kept very moist. When the seedlings have attained the height of about 9 inches, they are transplanted to a well-manured and carefully prepared plot with water covering it to a depth of about 3 inches, the land having been previously prepared from its natural state by several ploughings until the soil is worked into a fine muddy paste.

The seedlings are then planted in the mud by hand, two or three seedlings together, about 6 or 9 inches apart. On the third day after transplanting, the surface water is drained off the field, and on the eighth day it is again filled with water to a depth of 2 inches or so. A hand weeding will be necessary after about a month's time. The soil should always be kept moist, by irrigation if necessary, and it is advisable that from time to time water should stand in the field to the depth of a few inches.

This variety attains maturity about six month after sowing.

I have to thank the commissioner for his kind gift of seeds of both varieties here mentioned. I have obtained further information which is of great value, and also seeds of various kinds of rice from His Excellency the British Resident at Penang Straits Settlements, who kindly forwarded seven varieties of rice seed new to this State, and I have arranged with Mr. C. Harch, of Alberton district, and Mr. Wm. Heck, of Pimpama Island, Logan district, to give a practical test of their growth and suitability, and also to test the climatic conditions of Queensland as being suitable for these tropical varieties. I also sent twenty-six varieties of rice to the Acclimatisation Society, that they may be properly tested and reported on fully for future reference. Altogether I have secured, so far, for experimental purposes this season twenty-five varieties. A list of these is hereto appended, with their native and botanical names so far as I have been able to obtain them. The tests are being conducted by practical farmers, and the results will be published, with illustrations, if possible, of the growth and seeding of the crop of each variety.

What I should like to see tried is a patch of the "Sugamomi" (Japan seed rice, Aman variety) in our Western districts, utilising the overflow water from one of our numerous bores for irrigating a few acres with this variety. I am sure that, either cut for hay or made into ensilage for times of drought, it would prove itself a standby of great importance to our pastoralists and cattlemen of the Western lands. The green crop is estimated at from 8 to 10 tons per acre. Surely this is worth a trial!

Twenty-five Varieties of Seed Rice from the Straits Settlements, Java, Japan, and Italy.

Straits Settlements Rice Seeds—

No.		
1.	Paddy Pulet Santan	Per favour of His Excellency the British Resident, Penang Straits Settlement.
2.	,, Puchok Nipah	
3.	,, Radin	
4.	,, Sejamput	
5.	,, Limbot	
6.	,, Sroub	
7.	,, Pulet Sutra	

Nagpur Early and Late Central Provinces, Nagpur, India—

8. Paddy Early Variety, "Ans"		Per favour of Director-General, Department of Agriculture, Central Provinces, India.
9. ,, Late ,, "Aman"		

Java Rice—

10. Paddy White Java, Upland No. 1
11. ,, ,, ,, No. 2
12. ,, ,, ,, No. 3
13*a*. ,, ,, Oryza glutinosa
14*b*. ,, ,, Sativa (var. Black Bearded)
15*c*. ,, ,, ,, White Bearded Paddy
16*d*. ,, ,, Praecox, Unbearded
17*e*. ,, ,, Sativa ,,

(The last five varieties obtained per favour of H.M. British Consul, Batavia.)

Italian—

18. Paddy Italian Upland

Japan—

19. Paddy Kobê, Japan No. 1
20. ,, ,, No. 2
21. ,, Sugamomi—1 Aman variety
22. ,, ,, 7 ,,
23. ,, ,, 10 ,,
24. ,, ,, 5 ,,
25. ,, ,, 3 ,,

(The last five varieties obtained per favour of Queensland Department of Agriculture.)

Other seed varieties have been asked for, and are expected from Louisiana, Madagascar, Singapore, Hongkong, and West Indies.

RICE-GROWING IN LOUISIANA.

Mr. F. W. Peek, of Beenleigh, who by his enthusiasm in the work of extending the rice-growing industry, will deserve to be held in honourable remembrance by the rice-growers of Queensland, has come to the conclusion that, after all, swamp rice may be cultivated on suitable lands. He has now either received some samples of paddy of this nature or has made arrangements for a small supply from different parts of the world. (*Vide* his article in this issue on "The Rice Industry of Queensland.")

The cultivation of all kinds of rice begins in the same manner as the cultivation of other cereals, but when the swamp rice is about 6 inches high it must receive different treatment to that accorded to upland rice.

In South-western Louisiana the rice is irrigated from wells or bores. A plentiful water supply is found in some of the rice districts at depths varying from 100 to 200 feet. Bores from 4 to 5 inches in diameter are put down, and pumping machinery set up—not by the planters, but by the canal companies, who are paid on a "tally" of one-fifth of the total crop. The water is pumped into canals, and each mile of canal will flood 1,000 acres of rice or 5,000 acres of other crops. In order to retain the water on the fields for the necessary length of time, small dams are built, and when the rice is from 6 to 12 inches high the fields are flooded to a depth of from 2 to 12 inches, until the heads are well filled. Then the water is run off, and the land is given time to dry before harvesting.

An average yield is 1,600 lb. per acre. The harvesting formerly done with the sickle is now done by the self-binding harvester. Of these machines some 4,000 are in use, each doing the work of forty men.

Rice straw has no equal as fodder for live stock. The milling is mostly done in the producing districts. The mills clean, sack, and sell the rice, receiving 50 cents (2s. 1d.) a sack (160 lb.) for the work. At this price a milling plant sometimes pays for itself in one season.

There are many bores in Queensland which furnish ample supplies of excellent water for irrigation purposes, and it would be well if some persons owning land near a bore were to experiment with a small plot of irrigated rice. There is no reason why this State should not grow all the rice required for local consumption. The land, the climate, and the water are all here. The industry has passed the experimental stage, and has been proved to pay better than wheat. Farmers should take the advice given by the *American Grocer*: "Young man, if you want to eat your own rice, go to the land of wells, canals, rice plants, and plenty."

RICE AS A FOOD.

The following remarks on rice as a food are very appropriate, seeing that the cultivation of rice is steadily spreading in this State. The article is taken by the *Louisiana Planter* from the *Crowley Signal*, and will bear reproduction in this *Journal*, as will also some "Rice Notes" from the former source:—

There can be but little doubt but what the shortage in the Western potato crop is doing more, just at present, in bringing rice and its virtues before the North and East than any and all advertising could have done. The big Northern dailies are now taking the matter up, and a general discussion of the virtues of rice as compared with wheat and other cereals is being indulged in.

Rice has one great drawback, and were it not for that there is not the slightest doubt but what it could easily stand any test with other cereals as a food. People know little about rice. Unlike wheat, corn, barley, &c., which have been milled, tested, and served in every imaginable way known to the culinary art, never until this year was any movement or effort made to display the true value of rice, and to-day over half the people of the United States do not know of more than one way of preparing it for the table. One year ago if the assertion had been made that rice would perhaps some day become a rival of wheat and corn, it would have been considered absurd. But rice is fast reaching that point. The secret of the mammoth consumption and popularity of wheat in this country is due partially to the manner in which it has been placed on the market for the use of the people. Enter the average grocery store to-day in search of a breakfast food, and you will find wheat put up in at least a half-dozen different styles ready to be served after a few moments' cooking. Rice can be put up in the same manner, cooked just as quickly, is more nutritious, and just as cheap.

People should learn to use rice. The trouble with consumption is but one thing—the lack of intelligence as to how to cook it; and when this becomes known from one end of the country to the other, rice will then prove a rival—and a strong one, too—of its western competitors.

RICE NOTES.

Mr. Miron Abbott, one of the largest rice planters in the State and largely interested in the immense system of irrigating canals now threading south-west Louisiana, has been having an interview in Crowley with the editor of the *Rice Belt News*, in which Mr. Abbott expressed his belief that the rice crop of Arcadia parish will turn out larger than has been generally believed. He believes that a large part of the crop will show up a yield of 10 to 12 sacks per acre, and says that rice now being threshed is yielding 15 sacks per acre.

Mr. Abbott referred to the reported exhaustion of some rice lands, perhaps from too severe cropping, and says they can be quickly redeemed and rejuvenated, a year or two of rest doing the business.

The rice kitchen at Buffalo continues to be a drawing card, and Louisiana is well known as a rice-producing State, the good things served in the rice

kitchen exciting the curiosity and the admiration of the thousands of visitors now frequenting this famous resort.

In a recent article the *Times-Democrat* refers to the merits of red rice. There is certainly no more reason for discriminating against red beans, and these latter are very popular and high priced.

The development of the rice industry in Texas has been sudden, and promises to be immense. In Orange county the rice harvest is in full swing, and hundreds of acres of the golden grain are falling before the reaper.

COST OF PRODUCTION AND THE MARKETING OF COFFEE.

Mr. H. Newport, Instructor in Coffee Culture, points out the difficulty of arriving at the cost of producing coffee in Queensland, but says that it is a great deal more than it ought to be. To get proper statistics on the industry, it must first be firmly established; and, secondly, well-organised and exact accounts must be kept by the growers. In older coffee-producing countries, the costs of the various works (*i.e.*, cost of production) are not only kept careful account of, but cut down, after years of experience, to the lowest possible point. Mr. Newport then goes on to say:

In Queensland the industry is still young, and in very few instances are accounts kept at all. Even were they available, they would form no criterion of the true cost of production in the State, or supply figures that could be compared on any common basis with those of any other country. I can say that coffee ought not to cost more than about 4d. per lb. (in parchment) to produce here, but even this rate would vary under different conditions and in different localities, and it will be a long time yet before any average can be struck for the whole State.

I certainly do not think coffee can be, or ever will be, produced at 2½d. to 3d. per lb., as American coffee is, but we have in our favour the protective tariff and the quality of the article.

This latter is an important point, and one that I trust you will not lose sight of. Santos, Mexican, and American coffees generally are what is known as low grade, and fetch a considerably lower price, in the bulk, in the open markets, as will be seen by reference to sale price lists, &c.

It practically means this—that if you produce cheaply you obtain an inferior acticle, and then it is a question as to whether it pays better to produce the *quantity* at a lower value or the *quality* at the higher value.

High-grade coffee will always sell before low grade, even though the low grades may swamp the markets with their quantity. In the factory the poor article requires *toning*, and this toning or strengthening is done by the high-grade coffees.

On these points *Planting Opinion* writes:—Coffee is a crop that has to undergo a process of preparation after being grown, before it can be placed on the market. It is not enough to grow the berry. To know how to grow this is one thing; to know what to do with it after the crops are grown is another. We take it that every coffee-planter in Southern India is capable of seeing that his crop is properly prepared for the curer; but it may be well to remark that mistakes on the estate cannot always be rectified at the curing-mill, and that every bad sample of coffee sent out as "Mysore," "Coorg," "Nilgiri," &c., damages the reputation of a whole district, perhaps even of "East India" coffee generally. Indian coffee should command a much higher average than Brazilian, because of its general superiority. There is little room for doubt, however, that the margin between prices of East Indian description and Brazilian is growing narrower. Either Brazilian is winning a better reputation or Indian is losing prestige. Every planter who, by carelessness or ignorance, helps to bring such a loss of prestige about is doing irreparable harm to his neighbours. We do not for a moment suppose that things happen here such as are said on excellent authority to have occurred in Jamaica, but the fact that

such ridiculous things should happen in that island ought to make planters here extra careful to see what it is that is really sent to market. The small settler system in Jamaica appears to lead to strange results when the coffee is packed. Mr. de Mercado recently stated there, in public, that he had in his office a museum of foreign substances found in bags of coffee sent to his firm. Among them were such things as pumpkins, a pair of baby's shoes, a chisel, a hammer-head, empty tins, several boots, and, in fact, pretty nearly every known article in the world. This was the result of gross carelessness. The people who packed the bags at the country shops were not dishonest; they simply let them lie about open, and when they emptied, say, a tin of condensed milk, it was the most natural thing in the world to throw it into the coffee bag, and perhaps the opener as well. Things are so bad in Jamaica that Mr. de Mercado states that experience has taught him that he dare not send away coffee without repacking it, or the people with whom he did business abroad would think he was not an honest man, and would write to tell him that when they wanted to buy hammers and chisels they would prefer to go to the hardware store.

We have no fear of this sort of thing here, but have referred to the above in order to give force to an exhortation to coffee-planters in India to see that their crop is dealt with in a cleanly manner, from beginning to end. Absolute cleanliness is the first essential in handling a crop. Barbecues, store-house, packages—all must be kept scrupulously clean. The result will be that the expense of placing the coffee on the market will be reduced. Railage will not have to be paid on dirt. The curers will not have to handle a large percentage of "foreign matter" with the coffee. Moreover, if the curers constantly receive coffee in a very clean condition their own inclination towards doing clean work and sending forward bags of clean coffee will be encouraged; and even the most enterprising firm is none the worse for receiving a little encouragement occasionally. What we have been urging is that planter and curer should both so work as to make the very best of the quality of coffee raised, so that the coffee may be put on the market in the best possible condition and the most attractive form, with a minimum percentage of extraneous substances included in each bag.

Another important point in the marketing of coffee is the cost of transport. Some little progress may be said to have been made, quite recently, towards a reduction of railage charges on coffee in Southern India; but a good deal remains to be done. In regard to steamer freights there is much greater room for improvement. Brazil gets a great advantage because of the immensity of her production and the fact that almost the whole crop is shipped at two ports. This concentration of cargo at two ports cheapens freights and expedites loading. In Southern India we cannot very well make up whole cargoes of coffee, and, as a result, a much higher rate of freight has to be paid. The matter is not one that can be put off, however. To a great extent the future of Indian coffee turns upon the solution of the problem of lowering the cost. Brazil has succeeded in lowering the cost; Mexico is producing at a very low cost. Everywhere there has been a downward tendency, and India must adapt herself to the situation. Rail and steamer freights should receive the closest possible attention, and every effort should be made to bring down to the very lowest point the cost of producing coffee and placing it on the market.

SISAL HEMP ON THE DAINTREE.

From Mr. T. Th. Pentzcke, of Hohenufer, Daintree River, we learn that four years ago he received nine Sisal suckers from the late Mr. Cowley, then manager of Kamerunga State Farm at Cairns. They were planted in October, and grew well until April, when a flood occurred, and the plants were under water for five days. The roots were destroyed, but the tops grew after being replanted. Twenty-four suckers were planted two years ago, and now Mr. Pentzcke has sufficient suckers to plant out 5 acres. The plants were grown on land which

had been under cultivation for twenty years, but the next crop will be on virgin soil, a cedar scrub just felled. It is to be hoped that this land is above flood reach, as it will be interesting to know how much fibre per acre can be produced on rich land.

Each full-grown plant should yield from twenty-five to one hundred leaves per annum; hence one acre containing 600 plants will produce from 15,000 to 60,000 leaves annually. The average yield of dry fibre from 100 leaves is 4 lb.; therefore 1 acre will give from 600 lb. to 1 ton of fibre. It is no uncommon thing for 1½ tons to be produced per acre, and with improved machinery over 2 tons may be expected. The working expenses are reckoned at about 30 per cent. of the value of the fibre per acre. Taking the average yield then at 1 ton per acre of a value of £30, a profit of £21 per acre may be made. Even putting the expenses at 50 per cent., there remains a profit of £15 per acre. The requisite machinery is inexpensive, and can be worked by boys. There are several machines of different kinds used in the Mauritius, Mexico, and Yucatan. They are known as the "Marabal," the "Kennedy," and a nearly perfect machine—Death and Ellwood's. One of the latter is capable of dealing with the crop on 100 acres. The cost is about £24. Steam or water power may be used to drive them, and they will turn out some 250 lb. of wet fibre per day.

THE DATE PALM IN QUEENSLAND.

From time to time the Acclimatisation Society has imported suitable varieties of dates from different parts of the world, and these have been distributed to different parts of the State, but those who receive them have, with few exceptions, taken no trouble to notify the society of results. It would be of great value if all those in Queensland who have date-trees growing would furnish us with some particulars concerning them, such as the source whence they obtain them, the month and year when planted, the geographical, geological, and climatic conditions under which they have been grown, whether bearing or unproductive, and any other particulars such as rainfall since planted, &c. We shall be greatly obliged to all who will furnish us with particulars such as we have indicated. Many parts of Western Queensland are well adopted for date-growing, and doubtless, with sufficient data to give encouragement to the industry, the Acclimatisation Society and the Department of Agriculture would not be found backward in leading the way.

TRASHING CANE.

The need for trashing in a humid climate is admitted by most cane-planters. When the cane is not trashed the rain is caught at the junction of the leaf and the stalk; dust blown into such spots forms with the moisture a soil in which the bud germinates and becomes a sprout which affects the density of the juice. This has just been well exemplified in Java. A Samarang correspondent of the *Louisiana Planter* writes as follows on the effects of dust and moisture on the cane plants of that island:—

The high spirits in which the sugar manufacturers started grinding have been reduced to a considerable extent by a long spell of rainy weather, lasting from the middle of June to the second half of July—at a time when drought was needed and expected. The usual consequences of rain—viz., bad roads and diseased bullocks—were aggravated by the fact that the canes, which had already attained their point of maturity, started growing afresh, thus lowering the sucrose content and the purity of the juice. Many people account for this undue rainy time through the recent eruption of the volcano Kloet in the

residency of Kediri. The immense quantity of volcanic ashes, the volume of which may be calculated at at least one cubic kilometer of solid rock, ejected in the atmosphere, occasioned terrible electric discharges, which may have caused the torrential rains over the whole island at a time when dry weather is the rule.

Besides the action of the ash and sand on the cane by breaking leaves and knocking down the stems, another curious phenomenon is reported from every part of the land where the ash has come down, which means a circle having a radius of 250 miles. The ashes gradually entered between the leaf-sheaths and the stem, where they formed a layer of mud with the subsequently falling rain-water, which covered the buds of the cane and the root beginning and induced them to germinate. The old canes were covered with young roots and sprouts, which by their growth extracted sucrose from the cane and spoiled the juice.

Moreover, the sharp ashes, consisting of feldspar, pyroxen, and magnetic iron, adhering to the cane wear out the mill rollers considerably, so that they look as if they were highly polished. The ashes carried along by the current of juice interfere with the proper measuring of the juice, as they leave a thick muddy layer in the measuring tanks after the juice is discharged. The juice-heaters are very soon choked with the mud, and the manufacturers are only rid of this impediment after it passes the settling tanks, where the ash rapidly subsides, owing to its high specific gravity of 2·5. Owing to the unfavourable meteorological circumstances, the crop is sure to fall below estimates, especially in the eastern parts of the island. Some experts even went so far as to prophesy a loss of 25 per cent. over the whole island, but the crop in the western and central districts is so very satisfactory that it makes up for a good deal of the inferior output in the eastern half. I do not believe the whole crop will come down below 10 per cent. under the estimate.

AN INDIAN EISTEDDFOD.

The idea of holding an Eisteddfod at Sylhet, in India, sounds rather strange, but, as there is a close affinity between the Welsh and Bengali languages, it is not so very surprising that the Welsh Institution should feel at home in Bengal. Amongst many competitions between the 220 persons who entered for them was one which caused great amusement. It was a reading competition. In one portion of the paragraphs to be read, the piece was unpunctuated, and in the other the words were all run into each other. We give the pieces, as they may cause some amusement to our young readers, and perhaps be an incentive to them to read other articles in the *Journal.*

Reading Test (Unpunctuated Piece).—"Two persons met to one another they were strangers though related by marriage but as they possessed observant eyes each other's features they recognised from a description they had had of one another from their mutual relatives the following conversation took place how are you to-day I am quite well yesterday I was not so well as you areliving near my uncle and aunt tell me how they are to-morrow I hope to see them well and how do you like the weather hot is it not cold wind would be very acceptable in this manner they talked one subject of conversation led to another and time flew on their hands then they shook each other's cheeks they kissed their feet they turned towards their respective destinations."

Reading Test (Words Undivided).—"H e r e s t a t e d w i n d l e d f r o m t h o u s a n d s t o n o t h i n g a l a s h o w r i c h e s t a k e u n t o t h e m s e l v e s w i n g s i n t h i s w o r l d a l l i s b u t a f l e e t i n g b r e a t h w h a t w e d e e m t o b e t h e s u b s t a n c e i s o n l y a n e m p t y s h a d o w."

Forestry.

FORESTRY IN SWEDEN.

Sweden is a small country, having an area of 170,979 square miles and a population of 4,784,675 inhabitants. It has thus only about one-fourth of the area of Queensland, and over $4\frac{1}{4}$ million more inhabitants. Yet compare the working of the forests of Sweden with that of any portion of Australia. It was in either in Norway or Sweden—the former, we believe—that the vast timber industry of to-day was initiated by one sawmill driven by a water-wheel and only one saw. From a late consular report we learn that scientific forestry has proved to be a most profitable business to the State. There are in Sweden 18,000,000 acres of public forests, of which 12,500,000 acres are under what is termed scientific management. There is in Sweden a central forestry bureau, a forestry corps for work in the field, comprising nine inspectors, eighty-eight chiefs of range, having equal rank with captains in the regular army, besides many foresters and watchmen. The State forests average 166,250 acres in each range. There is a college of forestry and six schools of forestry. For forestry management, administration, and instruction the State annually expends, according to the report of 1899, £96,730. The income to the State from forestry the same year was £420,222, the forests at the same time growing more valuable every year.

DESTRUCTION OF TIMBER ON THE DAINTREE.

Mr. Pentzcke, whose notes on Sisal hemp we give in another part of this *Journal*, mentions that there is very serious destruction going on on the river of timbers which would be most valuable for veneers if cut to suitable sizes and exported to the continent of Europe. Timber for veneers is there sold by the pound weight, and from fourteen to sixteen veneers are cut from 1 inch. West Indian mahogany is sold in the London market at from 4d. to 1s. 6d. per superficial foot of planking 1 inch thick. Messrs. Broadwood, the piano-makers, some years ago gave £3,000 for three magnificent logs of Spanish mahogany. Each log measured 15 feet in length and squared 38 inches. The wood was of most exquisite beauty. We have timbers in Queensland which for beauty of grain and durability rival any timbers of any other country, but we simply cut them down and burn them.

There is a species of palm—the black palm—growing on the Daintree, which the blacks destroy as soon as the trees are mature, presumably for the sake of the delicate centre of the head. On the continent this timber is sold as "black ivory." Out of it columns are made 20 feet in height and 9 inches in diameter. If required to carry a heavy ceiling, they are bored as alder-trees are bored for water pipes. An iron bar is then passed through the centre of the column, which is then beautifully polished, and a number of such columns are used for supporting handsome ceilings in great halls and saloons. Numbers of these valuable palms are destroyed for walking-sticks, and Mr. Pentzcke throws out the suggestion that everyone carrying a black-palm walking-stick should be made to pay a license. The stump of this palm cuts marvellously beautiful veneers.

The destruction of native birds, such as the cassowary, is a distinct menace to the existence of such timbers, as the birds swallow the nuts, seeds, &c., and stone fruits to a very large extent and deposit them all over the scrubs and forests, where they grow and flourish, covering even bare ridges in time with dense scrubs. Without the cassowary, the black palm would have disappeared long ago, mainly owing to destruction by blacks and white vandals.

The birds also, such as the scrub turkey and scrub hen, are the most formidable and voracious hunters after snails and various insect pests in the North. If these birds are ruthlessly destroyed, the insect pests will increase in the scrubs—their present habitat—and will naturally spread to the plantations. As the scrub hen lays only one egg a week—many often laying in the same nest—it follows that the extinction of the bird will only be a matter of a short time.

Science.

ANALYSIS OF TAN-BARK.

In March last, Mr. M. J. Gallagher, proprietor of the Kedron Tannery, requested the Department of Agriculture to recommend a remedy for the disagreeable smell so characteristic of colonial-tanned leather, which is a serious drawback the tanning industry has to contend with. Mr. Gallagher forwarded samples of the following tanning materials, asking that they might be analysed by the chemist to the Department, Mr. J. C. Brünnich. These were: Ground Valonia, ground Myrobolans, unground Valonia, unground Myrobolans, best Adelaide bark in its raw state, bark liquor No. 1, first liquor and No. 2, second liquor which had been used on hides in the first and last stages. Mr. Brünnich accordingly analysed the three liquors with the following result:—

—	Liquors.		
	A. Best French.	B. Six Weeks Old.	C. Very Old.
Barkometer density	46°	40°	20°
Specific gravity	1·0455	1·0388	1·0202
Corresp. to Barkometer degrees	45·5°	38·8°	20·2°
Total extract in liquor, per cent.	11·29	9·04	4·88
Tannin in extract ,, ...	9·32	7·68	Nil.
Ash of extract ,, ...	·48	·68	·78
Acetic acid free in liquor ,, ...	·108	·058	·014
,, ,, combined with lime ,, ...	Nil.	·056	·108
Lactic acid ,, ...	Nil.	·10	·05
Lime water test co. per 100 cc. liquor	20·2	13·5	5·5

From the analyses it is shown that the specific gravity agrees with the Barkometer degrees; but of how little value the latter is for judging the amount of tannin is strikingly shown by the third liquor, which is completely exhausted of all its tannin, and the 20 Barkometer are only due to impurities as colouring matters and a fair amount of lime salts.

The liquors contained a smaller amount of the various micro-organisms than the liquors examined in April last, and the amount of acetic acid is also considerably less. The liquors are, however, still deficient in lactic acid.

Report on Tanning Liquors and Materials received from Mr. J. Gallagher, of the Kedron Tannery.

An investigation by analyses and microscopical examination of the samples of tanning liquors and materials received show a rather high acidity in the liquors, which is chiefly due to acetic acid, whereas a predominance of lactic acid is desirable in soured liquor. The process of souring is entirely due to the action of micro-organisms; and whereas the first liquor contained hardly any organisms (but still contained a very large amount of acid, showing that already fermentation must have taken place), the second liquor contains a very great variety of such. The souring of the bark liquor should be a very slow process, at not too high a temperature, and is, like any other process of fermentation, influenced by the temperature, the original quality of liquors, and by inoculation with either favourable or unfavourable germs. A liquor which contains lactic acid, due to the slower lactic fermentation, produces a better, more supple leather, and I have no doubt also of a better odour.

The usual test for acidity is made at tanneries with lime water, and 10 cc. of the tanning liquor should use from 5 to 12 cc. of lime water before a

permanent precipitate is produced. I find, however, that already the fresh 1st liquor uses 21 cc. and the No. 2 liquor 32 cc. of lime water.

The materials itself used for the preparation of the liquor are of the best quality:—

	Per Cent. Tannin.
Adelaide bark containing	31·4
Myrobolans (ground)...	40·2
Valonia (ground)	39·0

The liquors were of the following composition:—

	No. 1.	No. 2.
Tannin	6·22 per cent. ...	8·02 per cent.
Volatile acid (acetic acid)	·27 ,, ...	·30 ,,
Non-volatile acids (lactic, &c.) ...	Nil. ...	·08 ,,
Lime water test per 10 cc. liquor ...	22 cc. ...	32 cc.

I have not the slightest doubt that the process resulting in a disagreeable smell of the finished leather is entirely due to unfavourable fermentation, which requires the careful research of technical mycologist or bacteriologist to tell which of the organisms found in the liquor are favourable or otherwise.

In many industries, where fermentation plays an important part, similar troubles have been experienced, and have only been overcome by inoculating the products with the proper germs required for the special fermentation. In this particular case it may be possible to add to the fresh liquors little of old liquors which had given the best result with regard to quality and odour of the finished leather. Further advice might possibly be given, if I was acquainted with the local conditions, and by a careful study of the process at the tannery itself.

Chemical Laboratory,
Queensland Agricultural College,
Gatton, 5th October, 1901.

Mr. Brünnich also furnishes an examination and analysis of sawdust from a tree which when sawn is supposed to destroy the edge of the saw.

The sawdust contained:—

Water...	11·95 per cent.
Ash	·83 ,,
In water soluble matter, starch, &c. ...	3·10 ,,

The watery extract had a very slight acid reaction. According to the analysis, this wood contains nothing which would account for the action on steel; the microscopic examination of a small splinter of the wood, found amongst the sawdust, shows the absence of any crystalline incrustations. The wood is very closely and evenly grained, and some of the cells, larger vessels, contain starch grains.

ANALYSES OF GRASSES AND FODDER PLANTS—II.

By J. C. BRÜNNICH, F.C.S.
Chemist to the Department of Agriculture.

As an addition to the analyses of some grasses, published in the August number of this *Journal* (Vol. IX., part 2, page 245), I am able to give now the results of the analyses of another younger sample of *Paspalum dilatatum;* the great winter grass, Prairie Grass; the celebrated English grass, Cocksfoot; and also of the principal crop of this district, Lucerne.

1. Lucerne (*Medicago sativa*).—Grown in first-class soil of the Queensland Agricultural College, on the banks of the Lockyer Creek. The crop analysed was the second cut, was of about four weeks' growth, and was taken just before it began to flower. (Cut 17th September.)

2. Prairie Grass (*Bromus unioloides*).—Was grown on similar rich soil of the Queensland Agricultural College; was, when cut (17th September), about four months old; in average, about 3 feet high; and well flowered. The analysis bears out the reputation of this well-known grass as an excellent winter feed.

3. Cocksfoot Grass (*Dactylis glomerata*).—This grass was grown by Mr. J. Long, of Sylvia Park, Toowoomba, and was sown three years ago in very rich brown virgin soil. The land was ploughed very deep, thoroughly cultivated, and sown at the rate of about 2 bushels of seed to the acre. No stock has been running on this patch of grass since June last. The square yard of the grass was measured off, cut, and weighed by Mr. Long on the 22nd October, being then of about eighteen weeks' growth. The exceptional favourable conditions account, undoubtedly, for the enormous production. The grass when it was cut was well in flower; the seeds had already formed, although not ripe. Although the crop of this grass is such a heavy one, the feed value is very high, and is slightly higher than that of Prairie Grass. Both of the grasses are far ahead of *Paspalum dilatatum*, which again contains a very small amount of nitrogen and nitrogenous matters. Of course, it is very doubtful if these grasses would bear such heavy crops as *Paspalum dilatatum* under unfavourable conditions.

I must add that Mr. Long has a great variety of grasses growing in experimental plots of various sizes, and I asked him to forward other samples for analyses whenever they are ready to cut.

4. *Paspalum dilatatum*.—This sample was taken from the same ground as the sample cut on 22nd April last, and reported on in the above-mentioned article. The grass, when cut (4th November), represented about eight weeks' growth, had flowered for some time, the seeds being well formed, but still quite green. The weight of the present crop per acre is almost identical with the previous one, and the analyses also agree very closely. Of course, the amount of digestible fibre is, as was to be expected, very much higher, as this sample was very much younger and succulent. The amount of nitrogen is again very low, and I must add that the determination was made in triplicate, the results agreeing very closely.

—	I.—Lucerne.		II.—Prairie Grass.		III.—Cocksfoot.		IV.—*Paspalum dilatatum*.	
	Hay.	Grass.	Hay.	Grass.	Hay.	Grass.	Hay.	Grass.
Tons per acre	1·54	6·48	2·67	6·88	8·64	28·09	3·30	10·44
Lb. per acre	3,450	14,520	5,986	15,416	19,357	62,920	7,389	23,395
Per cent. of:—								
Moisture	12·86	79·30	13·01	66·22	11·92	72·90	10·15	71·62
Total dry substance ...	*87·14*	*20·70*	*86·99*	*33·78*	*88·08*	*27·10*	*89·85*	*28·38*
Soluble albuminoids ...	2·89	·69	3·01	1·17	2·37	·73	·81	·26
Insoluble albuminoids ...	9·28	2·20	2·54	·98	5·69	1·75	3·52	1·11
Digestible fibre	23·60	5·61	29·25	11·35	26·49	8·15	35·49	11·20
Woody fibre	21·27	5·06	24·22	9·41	25·96	7·99	29·71	9·38
Soluble ash	7·41	1·76	4·72	1·83	2·93	·90	6·70	2·12
Insoluble ash	2·32	·55	·2·28	·89	3·51	1·08	2·84	·90
Crude ash	*9·93*	...	*7·23*	...	*6·70*	...	*9·54*	...
Pure ash	*9·73*	*2·31*	*7·00*	*2·72*	*6·44*	*1·98*	*9·54*	*3·02*
Fat	1·33	·31	1·26	·49	2·13	·66	1·20	·38
Amides, &c., by difference	19·04	4·52	19·71	7·66	19·00	5·85	9·58	3·03
Total	100·00		100·00		100·00		100·00	
Amide nitrogen	1·022	·243	·566	·220	·462	·142	·098	·031
Total nitrogen	2·969	·706	1·455	·565	1·750	·539	·791	·250
Feeding ratio	1 ÷ 2·4		1 ÷ 8·3		1 ÷ 7·0		1 ÷ 16·0	

Analysis of Ash:—	Pure Ash in Hay.	Crude Ash.	Pure Ash in Hay.	Crude Ash.	Pure Ash in Hay.	Crude Ash.	Pure Ash in Hay.	Crude Ash.
Carbonic acid ... CO_2	...	1·83	...	·30	...	·35	The Analysis of Ash of Paspalum hay was not made this time, as it has already been given.	
Unburnt carbon C	...	·19	...	2·99	...	3·54		
Silica ... ... SiO_2	·57	5·77	2·59	35·81	2·49	37·20		
Sulphuric acid ... SO_3	·21	2·11	·17	2·44	·11	1·71		
Chlorine Cl	·47	4·73	·64	8·91	·64	9·55		
Phosphoric acid P_2O_5	·53	5·33	·33	4·59	·24	3·57		
Ferric oxyde ... Fe_2O_3	·26	2·57	·12	1·66	·03	·40		
Lime ... ... CaO	3·82	38·46	·96	13·27	·43	6·42		
Magnesia ... MgO	·49	4·92	·40	5·47	·26	3·90		
Potash ... ... K_2O	3·14	31·59	1·78	24·55	2·15	32·14		
Soda ... ... Na_2O	·35	3·52	·15	2·11	·23	3·52		
		101·02		102·10		102·30		
Less Oxyg. equiv. to Cl.	...	1·07	..	2·01	...	2·15		
Total		99·95	...	100·09	...	100·15		

The analyses show that *Paspalum dilatatum* is of quite a different nature with regard to its feeding value than the other grasses—Couch Grass, Prairie Grass, and Cocksfoot—which all contain much more nitrogenous matters, and the feeding ratio or the ratio of the digestible nitrogenous to the digestible non-nitrogenous matters is, in the latter grasses, much nearer to the required standard of 1 ÷ 5·4; whereas Lucerne, which is a nitrogenous crop, contains too much nitrogen to be used as feed by itself, the feeding ratio being 1 ÷ 2·4.

With regard to the amount of plant foods taken from the soils during the growth of the crops, it will be seen that Lucerne, Prairie Grass, and Cocksfoot require a large amount of potash salts—Lucerne, in addition, a large amount of lime. To compare the amounts of plant food with those previously given, I give the following table:—

—	Lucerne.	Prairie Grass.	Cocksfoot Grass.	*Paspalum dilatatum.*	Ordinary Pasture.	English Meadow.
	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.
Nitrogen...	102	87	339	63	33	49
Potash	109	107	417	81	14	51
Soda	12	9	45	54	11	9
Lime	132	57	83	18	9	32
Magnesia	17	24	50	14	10	14
Phosphoric acid	18	20	46	25	12	12

When comparing the amounts of mineral substances taken from the soil by the various crops, the different age of the crops must be taken into account, as the above amounts are taken up by Lucerne in about four weeks' time, by Prairie Grass and Cocksfoot in four to five months. Again, it must be remembered that Lucerne is able to draw its plant foods to a great depth from the subsoil, whereas grasses are depending mostly on the top soil. The nitrogen, again, which for all the grasses must be actually present in the soil in one form or the other in order to obtain a good crop, is, in the case of Lucerne and any other leguminous crop, taken, by the aid of their root nodules, from the atmosphere.

I take the opportunity of correcting a slight error which occurred in the former article on grass analysis. The figures given as tons of hay per acre are really the total amount of dry substance per acre; the actual amount of hay per acre should be as follows:—

	Paspalum.	Ord. Pasture.
Tons hay per acre	3·201	... 1·606
Lb. hay per acre	7,171	... 3,597

Directions for Sending Samples of Grass to the Laboratory.

A square yard has to be plotted out with pegs in the middle of the crop which is to be sampled, strings or wires stretched from corner to corner, and all the plants collected which grow in this square yard, cutting them close to the ground. The whole is at once carefully weighed; after weighing, dried in a protected shady place and weighed again, and the whole sent securely packed to the laboratory. In some cases it is advisable to take the roots also, but they have to be kept separate. It is not advisable to send the green stuff, as it might get mouldy during transit. When sending the sample it is important to send, at the same time, full particulars with regard to age of the crop, conditions under which grown, description of soil, if manured, &c.

SUGAR AS A FOOD.

Sugar is a carbo-hydrate—that is, a compound of carbon, hydrogen, and oxygen, in which the hydrogen and oxygen are present in the proportion in which they exist in water. * * The great feature in the metabolism of all these carbo-hydrates is that they are completely oxidised in the body into water and carbonic acid without any waste and leaving no residue.

It has been amply proved that sugar can under certain circumstances be converted into fat, in which form it can be stored in the body, and so be capable of producing heat and force in the future. It is also what is called a proteid-sparing food—that is, it will save the wear and tear of the proteids of the body. Then, again, it is pleasant to take, and thus acts as a relish, stimulating the activity of the digestive processes.

It should, therefore, be an admirable food, not indeed for building up tissues, but for producing heat and energy. It has the additional advantages that it can be stored in a very small space, and that it will keep for a practically unlimited time.

In 1893 Mosso made careful experiments upon men with his ergograph. He found that much less muscular deterioration occurred under a sugar diet, and also found that, when the muscles were fatigued and incapable of further work, a sugar diet quickly rendered them fit again.

In Berlin, in 1895, Staff-Surgeon Schumberg experimented upon various men, both of weak and strong muscular physique, taking special care to exclude all possible influence and suggestion. He found that in half to three-quarters of an hour 30 grams (28 grams are equal to 1 oz. avoirdupois) of sugar restored the power of work to muscles so tired that they had previously given hardly any appreciable results. His practical conclusion was that sugar being so easily absorbed, and so soon available as a source of energy, forms a veritable and most valuable muscle food, and in small doses is well adapted to help men to perform extraordinary muscular labour. He also made the remarkable discovery that sugar is able, through its influence on the nervous system, to overcome the feeling of fatigue.

At the same time that these experiments on sugar were being carried on, men who were actively engaged in athletic pursuits were beginning to find out its usefulness. The ever-increasing army of cyclists discovered its value, not merely as a muscle food, but also as a potent and speedy recuperator in case of fatigue. Alpine climbers, too, gave up their old custom of relying on alcohol as a restorative and stimulant, and took to sweet stuffs instead. In Holland Birnie advocated sugar training for athletes. It was tried by several rowing clubs, and it was found that the young men who took large quantities of sugar bore the training better than their fellows, and did not become stale or overtrained. Their example was followed by the rowing society of Berlin.

In December, 1897, the question of the usefulness of sugar as a food for soldiers was raised in the German Parliament, and, in consequence of the discussion that ensued, a further investigation took place at Metz during the autumn manœuvres of 1898. Twenty men were selected from each company;

an extra ration of 100 grams of sugar was issued to ten out of each twenty selected. The results were conclusively in favour of the sugar-eaters. They increased in weight, which their comrades did not; they enjoyed better health, and were able to support the hard work with much less distress. None were overcome by exhaustion, and their pulse rate and breathing were less affected by exertion. They relished the sugar, too, and did not get surfeited by it. The use of a lump or two was described as acting like a charm, not only against fatigue, but also in quenching thirst. As a result of these experiments it was resolved that the sugar ration for the German soldiers should be raised to 60 grams per diem. The English soldier gets 37 grams.

I have just spoken of the unexpected stimulating properties of sugar. In practical confirmation of this fact, we find Dr. Nansen saying that he considered brandy drinking in Northern regions injurious, and stating that during his voyage its place was supplied by fruit and various kinds of sweets, of which there were large supplies on board the "Fram."

All this evidence tends to show the great value of sugar as an article of diet. It does not seem improbable that the increasing height and weight and the improving health of the English people during the last half-century are, at least to some extent, due to that greater consumption of sugar which has been rendered possible by its cheapness.—*British Medical Journal.*

MR. RANDALL AT GLASGOW.

Judging by the notices in the Scotch journals on the work of our emigration lecturer in the old country, Mr. G. Randall, it is evident that the methods adopted by him meet with approval in the Land o' Cakes. The following is from the *Scottish Trader*, a representative of which journal interviewed Mr. Randall at the Glasgow Exhibition, at which Queensland made a splendid show:—

It is positively delightful to hear Mr. Randall speaking of the hopes, the prospects, and possibilities of the "Queenly Colony"; he has all the colonial perfervid love of country, and, judging by the magnificent display made by Queensland in the Industrial Hall, we have no doubt that Mr. Randall's most optimistic predictions regarding the colony will be amply fulfilled. Many of us are precluded from taking advantage of the facilities and privileges offered by the Queensland Government because of our not being artisans or agriculturists, &c., but there are many farmers, farm labourers, and tradesmen, who are eking out an existence in our restricted agricultural areas or in the crowded metropolitan centres, to whom Queensland offers an opportunity for acquiring a competency for themselves and their families that only one man in a thousand possesses here.

Asked as to whether he had been getting many emigration inquiries, Mr. Randall said that these had decidedly been on the increase during the past few weeks, and were made by all classes. "It is the one thing over and above all others our country needs—more people. Yes, we want capital, I know, but not that alone; we want the men as well. We want the investor with us on the spot, with his brains, his labour, his intelligence, his interest, to start, establish, and carry out enterprises, industries, and business, whether in trade or commerce, mining or farming. At this moment there are excellent openings for enterprising men with capital to start winemaking at Roma, a woollen factory at Rockhampton, more flour-mills on the Darling Downs, a pineapple canning factory at Brisbane, drying bananas for the British market at Cairns, to say nothing of a score of minor industries awaiting the advent of pushing and determined men."

We further learned in conversation that a large proportion of Queensland colonists are Scotchmen, many having taken leading positions in the public life of the State. They are invariably successful, and are always ready to give a hearty and cordial welcome to newcomers from the old country.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1900.			1901.									
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.
North.													
Bowen	0·31	0·05	2·30	17·25	6·23	8·26	4·75	0·94	0·19	0·10	6·36	0·18	0·93
Cairns	1·52	1·61	4·19	11·53	22·09	14·93	8·87	13·18	0·57	0·89	2·53	1·82	2·34
Geraldton	3·17	2·39	18·68	23·32	32·93	37·64	26·10	26·[illegible]2	1·21	2·58	11·77	3·37	3·85
Herberton	Nil.	3·11	4·01	8·25	4·16	10·95	2·87	3·80	0·18	0·64	2·53	1·04	4·92
Hughenden	Nil.	0·10	0·61	1·62	1·41	2·82	1·74	3·48	0·03	Nil.	0·33	Nil.	0·31
Kamerunga	1·98	1·28	2·38	15·91	22·36	13·09	9·57	13·18	2·09	2·60	1·94	1·72	1·19
Longreach	Nil.	0·19	0·11	0·41	0·22	3·09	2·56	5·95	0·09	Nil.	0·37	0·58	Nil.
Lucinda	1·33	0·88	2·48	31·80	24·76	15·78	9·16	8·63	2·89	2·17	5·89	0·30	2·59
Mackay	0·48	0·12	7·00	24·85	8·99	10·13	6·80	1·32	0·25	1·07	5·14	2·29	1·35
Rockhampton	0·53	1·15	0·68	0·49	8·26	5·53	2·84	0·79	0·24	2·29	3·04	1·78	0·51
Townsville	0·91	0·05	0·76	14·91	12·94	4·95	3·13	0·74	0·32	0·19	1·87	0·14	0·90
South.													
Barcaldine	Nil.	0·30	1·20	0·15	1·17	3·70	1·90	2·21	0·82	0·63	0·25	0·51	0·54
Beenleigh	0·26	2·80	1·49	5·99	4·30	11·44	4·17	4·55	4·15	1·34	4·49	0·70	3·35
Biggenden	0·87	1·65	0·06	1·11	2·55	6·19	6·35	1·47	1·60	0·74	2·81	2·11	1·35
Blackall	Nil.	0·29	0·17	0·29	0·90	2·28	3·96	3·80	0·90	0·55	0·44	0·88	0·60
Brisbane	0·14	2·48	0·55	3·43	2·96	11·70	3·10	2·29	3·29	1·31	3·71	1·30	3·25
Bundaberg	3·05	1·06	1·28	2·34	2·61	3·17	10·27	1·14	0·74	2·01	5·59	1·80	2·18
Caboolture	1·99	0·86	2·11	1·11	5·51	11·53	4·64	3·34	2·27	3·70	3·18	1·55	5·01
Charleville	0·13	0·19	1·13	0·19	0·22	1·10	2·61	3·28	0·93	1·27	0·92	0·32	0·04
Dalby	Nil.	1·77	3·37	2·89	0·44	4·77	3·12	1·12	3·59	2·83	1·66	1·11	4·09
Emerald	0·18	0·31	1·08	3·65	4·43	3·25	0·88	1·31	0·63	0·90	1·74	1·11	Nil.
Esk	Nil.	1·35	1·80	3·99	3·15	8·36	4·11	1·78	2·45	3·01	3·03	1·72	4·87
Gatton College ...	Nil.	4·12	0·47	6·27	1·54	6·73	3·86	1·55	2·93	1·53	3·23	1·06	3·02
Gayndah	3·21	1·84	0·08	1·22	2·10	4·22	3·97	0·97	2·32	2·29	Nil.	1·91	2·39
Gindie	0·27	0·49	1·32	1·57	1·62	2·07	0·44	1·21	0·84	1·34	1·77	1·81	0·53
Goondiwindi	0·26	0·90	0·94	0·59	0·25	3·53	1·82	1·90	1·73	2·30	1·55	0·67	2·83
Gympie	0·18	0·84	0·47	2·57	3·10	18·56	3·89	3·38	2·82	3·40	3·39	1·34	...
Ipswich	0·01	3·93	0·47	2·09	2·88	7·01	3·38	1·43	3·16	0·97	2·47	3·54	3·98
Laidley	Nil.	4·55	0·63	4·01	1·58	6·94	3·81	1·47	2·54	2·00	5·32	1·22	3·37
Maryborough	1·22	0·68	1·18	5·03	5·51	11·76	5·58	4·09	2·22	3·07	5·02	1·05	1·54
Nambour	0·52	1·91	2·19	4·25	9·13	18·01	3·33	7·25	3·33	6·80	4·42	0·98	3·89
Nerang	0·26	3·02	2·92	4·26	4·22	14·91	5·12	5·42	5·34	0·79	5·41	0·88	4·57
Roma	0·66	2·20	3·28	1·13	0·11	1·77	1·11	1·11	2·66	2·26	0·98	0·43	0·71
Stanthorpe	0·23	2·17	2·16	1·94	0·80	3·95	2·13	0·77	2·74	1·52	4·22	1·42	2·93
Taroom	1·47	0·45	0·2[illegible]	1·40	0·10	3·15	1·88	1·70	2·19	2·74	2·34	2·11	0·92
Tambo	Nil.	1·87	1·52	0·52	0·51	1·66	2·75	2·85	1·47	0·73	0·74	1·47	0·51
Tewantin	1·48	0·74	0·95	7·04	14·18	20·33	11·70	12·20	5·45	8·34	4·61	2·71	3·26
Texas	0·35	2·67	3·33	1·29	1·35	4·58	1·46	1·10	1·87	1·00	3·06	1·47	1·47
Toowoomba	0·43	2·42	2·40	3·60	1·76	6·84	6·59	1·04	3·57	2·22	5·57	1·85	4·45
Warwick	0·13	2·01	2·50	2·90	0·26	5·56	2·91	0·82	3·47	1·57	5·74	2·05	3·12
Westbrook	0·04	4·59	1·35	1·88	0·73	4·37	3·38	0·74	3·48	1·64	6·50	1·75	2·27

CLEMENT L. WRAGGE,
Government Meteorologist.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

Butter (duty free).—Australian, 108s. to 110s.; Danish, 123s. to 126s.; Canadian, 110s. to 112s.

Cheese (duty free).—American, 46s. to 47s.; Canadian, 46s. to 47s.; New Zealand, 46s. to 48s.; Australian, 46s. to 48s. per cwt.

Sugar (duties, raw, 2s. to 3s. 10d.; refined, 4s. 2d. and ¼ per cent.).—Refined, £16 to £17 per ton; German beet, 88 per cent., 7s. 7½d. per cwt.

Syrups (duty, 2s. per cwt. and ¼ per cent.).—Finest, 14s. to 17s. per cwt.

Molasses (duty, 2s. per cwt. and ¼ per cent.).—6s. 9d. to 7s. 6d. per cwt.

Rice (duty free).—Rangoon, £10 to £15; Japan, £13 to £18; Java, £20 to £25; Patna, £20 to £24 per ton; Queensland (Pimpama Island), valued at £18 10s. in the London market.

Coffee (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, small to good middling, 42s. to 98s.; good to finest, 100s. to 121s.; peaberry, 70s. to 127s.; Santos, 28s. to 45s.; Mocha, 75s. to 100s.; Jamaica, finest, 95s. to 118s. per cwt.

Arrowroot.—St. Vincent, 1d. to 4d.; Natal, 5½d. to 7½d.; Bermuda, 1s. 5d. to 1s. 8d. per lb.

Wheat.—Australian, white, 27s. 4½d. to 28s. 6d.; New Zealand, white, 28s. 3d.; Duluth, red, 30s. 6d.; Manitoba, red, 30s. 6d.

Flour.—Australian, 19s. to 21s. per 280 lb.

Malting Barley.—English, 25s. to 26s.

Oats.—New Zealand, 24s. to 26s. 6d. per 384 lb.; Canadian, 17s. 9d. per 320 lb.

Split Peas.—45s. per 504 lb.

Ginger (duty free).—Calicut, good medium, 85s. to 95s.; medium, cut rough, 39s. 6d. to 40s.; small, cut rough, 30s. to 34s.; Japan, rough, 33s. to 35s.; Jamaica, good bright, 53s. to 66s.; middling to fair, 40s. to 50s. per cwt.

Pepper.—Capsicums, 15s. to 80s.; chillies, 35s. to 50s. per cwt.

Tobacco.—American: Thomas H. Edwards and Co., Liverpool, report the following prices:—

Leaf.	1901.
Western—	
Common Export ...	— @ —
African Export ...	— @ 5 @ 6½
Short Trade ...	3 @ 4
Medium to good Trade...	4½ @ 6
Burley ...	6 @ 7½ @ 8
Virginia Dark—	
Common Export ...	none
Short Trade ...	— @ 3½
Medium Trade ...	4 „ 5
Good to fine Trade ...	5¼ @ —
Virginia and Carolina Bright—	
Common or Semi-bright ...	4 @ 6
Medium or Mixed ...	6½ @ 8 @ —
Good to fine ...	9½ @ 11 @ 15

Wine.—Prices remain as quoted last month.

Green Fruit.—Lemons, finest selected, 27s. to 30s. per case; bananas, 8s. to 12s. per bunch.

Cotton.—Clean upland, 5½d. per lb.

Cotton Seed.—£7 per ton.

Cotton-seed Oil Cake (decorticated).—£4 12s. 6d. to £4 15s. per ton.

Cotton-seed Oil.—Crude, £21 10s. per ton.

Linseed.—54s. per 416 lb.

Linseed Oil.—£30 10s. to £30 15s. per ton.

Linseed Oil Cake.—£7 17s. 6d. to £8 2s. 6d. per ton.

Manila Hemp.—£25 to £30 per ton.

New Zealand Hemp.—£33 10s. per ton.

Wool.—Queensland greasy A and B combing, $8\frac{1}{2}$d. and 9d.; greasy pieces, 8d.; scoured, 1s. 5d. per lb.

Frozen Meat.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

New Zealand Mutton.

(Crossbred Wethers and Merino Ewes.)

	Nov. 9.	Nov. 16.
Canterbury	$3\frac{11}{16}$d.	$3\frac{11}{16}$d.
Dunedin and Southland	$3\frac{7}{16}$d.	$3\frac{7}{16}$d.
North Island	$3\frac{1}{4}$d.	$3\frac{1}{4}$d.

Australian Mutton.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	$2\frac{7}{8}$d.	$2\frac{3}{4}$d.
Light (under 50 lb.)	$2\frac{7}{8}$d.	$2\frac{3}{4}$d.

River Plate Mutton.

(Crossbred and Merino Wethers.)

Heavy	$3\frac{1}{8}$d.	3d.
Light	$3\frac{1}{8}$d.	3d.

New Zealand Lambs.

Prime Canterbury (32 lb. to 42 lb.)	$4\frac{3}{8}$d.	$4\frac{3}{8}$d.
Fair average	$4\frac{1}{4}$d.	$4\frac{1}{8}$d.

Australian Lambs.

Prime (32 lb. to 40 lb.)	—	—
Fair average	—	—

New Zealand Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	$2\frac{5}{8}$d.	$2\frac{5}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	$3\frac{7}{8}$d.	$3\frac{7}{8}$d.

Australian Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	$2\frac{3}{16}$d.	$2\frac{3}{16}$d.
Ox, hinds (180 lb. to 200 lb.) ...	3d.	3d.

These prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotation is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

Bacon.—Irish, 65s. to 67s.; American, 47s. to 50s.; Canadian, 58s. to 65s. per cwt.

Hams.—Irish, 80s. to 90s.; American, 54s. to 58s. per cwt.

Hides.—In fair demand at last quotations.

Tallow.—Beef, fine, £32 5s.; medium, £29 10s.; mutton, fine, £32 5s.; medium, £29 10s. per ton.

Agricultural Patents.

PATENTS ACCEPTED.

SHEEP-SHEARING MACHINE; BALANCED CUTTER PRESSURE.—Class 36 (13 Figures)—5998: John Kerwin Stewart, of No. 158 East Huron street, Chicago, Cook County, Illinois, U.S.A. "Improvement in the Construction of Clippers or Shearing Tools." Dated 7th May, 1901. (Drawings, 10s.; specification, 17s.) To obtain equality of pressure on the three fingers of the upper cutting comb, notwithstanding its flexibility and other irregularities, the pressure of the floating forked lever upon the two outer fingers is given by a screw which reacts on the main rocking-bar to which the central lever is attached, so that the total pressure is suitably divided, and all other elasticity is avoided in the action; a laterally rockable pivot for the floating lever causes equal division of pressure on the outer fingers. (7 claims.)

TOOTHED DRUM CULTIVATOR.—Class 28 (2 Figures)—6024: Samuel Henry Wilton, soap manufacturer, of West street, Mudgee, in the State of New South Wales and Commonwealth of Australia, Thomas Wilton, farmer, and John Wilton, farmer, both of McDonald Creek, near Mudgee aforesaid. "An Improved Roller, Digger, Pulveriser, and Cultivator." Dated 23rd May, 1901. (Drawings, 10s.; specification, 5s.) This has a cart body with central pole and draught-bar. The wheels have perforated rims to which segments can be bolted, forming a cylindrical drum extending from wheel to wheel the full width; these segments carry sharpened teeth or tines bent in the direction of an involute to the drum so as to penetrate the ground normally and come out with a lifting action; scraper teeth at the back clear off clods. The segments of the drum are divided spirally, and are made removable for convenience of carriage (in the cart body) from place to place. A lateral arm carries a mould-board that may be depressed when required to form ridges or earth-up rows of plants. (2 claims.)

BUCKET PUMP-STARTER FOR WINDMILLS.—Classes 69, 86, 91 (4 Figures)—6016: James Thomas Tylor, of Warwick, Queensland, traveller and machinery expert. "An Automatic Device for throwing Windmills in and out of Gear." Dated 17th May, 1901. (Drawings, 3s. 6d.; specification, 5s.) A bucket is hung to the starting and stopping wire of a windmill, and is so connected to the storage tank that when the tank is full the bucket also fills and in falling stops the mill; when the water-level falls the bucket empties and the mill again starts. Figure 1 shows a flexible pipe from the bottom of the bucket to the tank; Figure 2 shows the tank filled through the bucket, the bottom of which is connected by a flexible pipe to a float-valve in the tank; and Figure 3 shows a syphon connection. (3 claims.)

General Notes.

STERILISED MILK.

What is regarded as a great advance in the sterilised milk trade is recorded by the *Journal d'Agriculture Pratique.* The French National Society of Agriculture received recently a bottle of milk which had been sterilised for some months, and it was observed that there was no rise of cream to the higher part of the bottle, which was one of the chief objections to ordinary methods for sterilisation of milk. When milk is sterilised by being heated to boiling point or above, this treatment does not prevent the cream from rising, and later, when it is to be employed, the cream must be mixed with the rest of the liquid, though, as a rule, the said cream is transformed into butter by shaking. The happy idea of re-emulsionising the sterilised milk by subjecting it to a pressure of 250 atmospheres, which pulverises the fatty globules, was hit upon. It has been observed that their diameter became less than thirty-nine-millionths of an inch, and that, finally, the globules cease to collect in the form of cream on the surface.—*Exchange.*

GROWING ROOT CROPS.

It is not advisable to grow different varieties of turnips, swedes, kale, and other yellow-flowering root crops near together, as, if they happen to bloom at the same time, bees may carry the pollen from one to the other and thus bring about cross-fertilisation.

NATURE TEACHING.

The *Gardeners' Chronicle* says:—The Imperial Department of Agriculture for the West Indies has issued a text-book, entitled "Nature Teaching," based upon the general principles of agriculture. This is prepared for the use of schools by Francis Watts, Government Analytical and Agricultural Chemist, Leeward Islands. According to the preface, the book is "an attempt to place in the hands of teachers, both in elementary and secondary schools, a well-selected but co-ordinate body of information suitable to West Indian conditions, to be supplemented in each case by numerous illustrations and experiments in which pupils themselves take an active part." "Nature Teaching" treats of the seed, the root, the stem, and the leaf, each separately; as regards their uses and structure both botanically and economically. There also chapters upon the soil, plant food, and manures, flowers and fruits, weeds, and insects. The book is clearly written, but it is not intended to be read through, but to be used as a guide by the teachers in training pupils to observe for themselves, and in endeavouring to give them an intelligent interest in the everyday facts of rural life, and is very well suited for the purpose.

A NEW POTATO.

There is a so-called potato largely grown in the Soudan called the "Ousounyfy." It is unknown in cold climates, but is a boon to dwellers in Central Egypt and the Soudan. The tubers are the size of a walnut, soft black in colour. The plant bears prolifically, and is a valuable food in hot countries.

FOR BORING POSTS.

We (*Adelaide Observer*) give a sketch of a contrivance used for boring posts after they are erected:—

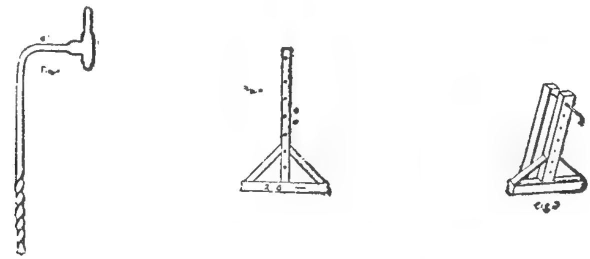


Fig. 1 shows the auger bent 6 in. from the handle hole. A short piece of round wood makes a good handle, which must be tightly fitted. The auger stand is easily made by morticing a 3 x 2 into a 5 x 3, and well stayed, as shown in Fig. 2. Of course, the stand is bored the same gauge as you wish the fence to be. Use some good hard wood. You are then ready to start, as shown in Fig. 3. By using this combination you save 30 per cent. in energy and 25 per cent. in time.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

SILO STACK—TAHITI LIMES—PIGEON-PEA.

G. Iles, Woombye—

Question 1.—What is the smallest stack of ensilage which can be successfully made?

Answer.—A stack containing 10 tons is small enough.

Question 2.—Have any Tahiti limes been put on the Brisbane market yet?

Answer.—Not in commercial quantities. The price of those brought in is not known to us. Young trees may be got from the nurserymen.

Question 3.—Are there any seeds of the Dal or Pigeon-pea for sale at the Agricultural College?

Answer.—No. The Dal was not thought a sufficiently valuable forage to be perpetuated there.

CAPONISING.

Poultry Farmer, Ipswich.—We have already published two articles on caponising cockerels, together with illustrations of the instruments required. These will be found in Vol. VI., pp. 25 and 281. As you may, however, not have the *Journal* of 1900, we give you the following, premising that we do not advocate the making of capons as a regular business. It scarcely pays. At all events, if you wish to experiment, we give you the following directions for the operation, taken from the London *Farmer and Stockbreeder:*—

The "capons" quoted in the London market reports are generally very superior cockerels, or entire male birds, as the art of caponing fell into disuse about the time when farming became so prosperous as to make men despise those small industries which, in these degenerate times, make just the difference between a profit or a loss on the year's business. The farmer who kept a decent hunter and rode to hounds was not disposed to take much trouble about poultry, and left that sort of thing to the women folks, who drew on him for poultry food, and deemed the money obtained by sales of eggs and table fowls as their special perquisites, or, at least, as coming under their unquestioned control. The operation, as formerly practised, was simply barbarous, and the death-roll very heavy. The Chinese practised the emasculation of cocks long before our countrymen practised their Druidical rites in forest glades or "under the old oak tree, by the light of the fairies' glance"; indeed, the operation as performed by Celestials is so old that history telleth not. Shakespeare's J.P., it will be remembered, is described as having a "fair round belly, with good capon lined." The method of operation in China, and in this country, was to cut open the abdomen, and with the finger, or finger and thumb, grope among the viscera until the essential organs of reproduction were discovered, remove them by force, and sew up the wound. Many died of rupture of the great abdominal vein at the time, and others wasted with peritonitis subsequently. Notwithstanding the great mortality, capons were made by certain women residing in the neighbourhood of Dorking until quite lately.

It was an American farmer (Mr. Miles) who introduced a better method—the same gentleman who taught our "vets." how to operate upon rig horses. By his practically antiseptic plan the birds suffer but very little pain, are not

sewn up at all, and, being liberated from the operating table, commence to feed at once. The small amount of suffering can be altogether obviated by chloroform, and at so trifling a cost as to be unworthy of consideration. Miles's method is to divide the skin and muscle between the two last ribs, and get a view within of the viscera by means of a spreader, while another instrument, like a pair of tongs, is inserted, with which to grasp the testicles one by one. If previous to cutting the skin, the bird's head is held in a wide-mouthed glass jar [illegible]t, with a sprinkling of chloroform at the bottom of it, he will soon drop [illegible] head and be perfectly insensible. The operation is so short that he need run no risk of an overdose of the anæsthetic, and, beyond being a bit tipsy, feels no inconvenience, generally feeding before he is quite able to walk straight.

Fasting for twenty to thirty hours makes the work very much easier, as the empty intestines collapse, and the testes are visible to the operator. The autumn months are the best for caponing, as spring chicken fetch too high a price to need any castration, but from August to the end of October leggy cockerels of no great value are a nuisance on the farm, neither fatting themselves nor letting the other sex have any peace. Birds made into capons during these months fatten without putting up, and come into the market as large, fine-fleshed fowls before the earliest of spring chicken come to hand and when game is over.

PLANTING SEASONS AT STANTHORPE.

C. AND F., STANTHORPE.—A correspondent asks us to supply some information as to the times and seasons for planting and sowing various crops in the Stanthorpe district. Mr. A. H. Benson, Instructor in Fruit Culture, has kindly prepared the following table, which will, we think, furnish all the information required:—

Crop.	Season to Plant.	Crop.	Season to Plant.
All grasses	March and September	Kafir corn	August to January
Apple	August	Lucerne	March to July
Apricot	July	Maize	August to January
Artichoke	May to September	Mangelwurtzel	August and September
Asparagus	August to October	Nectarines	July
Barley	March and April	Oats	March and April
Beans	May to December	Onions	April and May
Beets	February, March, September	Panicum	January
		Peach	July and August
Broom millet	August to January	Pear	July and August
Cabbage	March to September	Plum	July
Cape barley	January to March	Potatoes	August and March
Carrot	Nearly all seasons	Rape	September
Cauliflower	February and March	Raspberry	June
Celery	September	Rhubarb	August and September
Chestnut-trees	August	Rye	March and April
Clover	March	Sorghum	August to January
Cow pea	September to November	Strawberries	February to March
Cucumbers, melons	August to November	Sweet potatoes	September to December
Pumpkins, marrows	August and September	Teosinte	August to January
Culinary herbs	February	Tomatoes	July and September
Field peas	April to August	Tobacco	September
Fig-trees	August	Turnips	March and April
Flax	March to September	Vetches and tares	August to February
Grapes	August	Walnut	August
Gooseberries	July	Wattle-trees	August
Imphee	August to January	Wheat	March to June

Mr. Benson says that although the seasons for planting at Goondiwindi correspond fairly to the seasons at Stanthorpe, still they are for some products as much as a month later in the latter district. All deciduous trees should be planted from June to the middle of August.

BACON-CURING IN YORKSHIRE.

DAIRY FARMER, Nerang—

Can you tell me how to cure bacon, Yorkshire fashion?

Answer.—We have already given the Yorkshire method of bacon-curing in previous *Journals.* However, here is the method described by a Yorkshire expert, "Amicus," in the *Farmer and Stockbreeder*:—The way we cure bacon is to place the hams and flitches cut side down for twenty-four hours, then turn and rub with a small quantity of saltpetre around the bone, rubbing it well into the joint of the shoulder and hams; then rub back or skin side well with salt, having the salt dry, not wet, or damp even. Cover with a layer of salt, and leave for a day or two. Cover again any places, where salt may have melted, with clean salt, and take care to have a current of fresh air blowing through the room, and the temperature as even as possible. If very frosty, keep them from being frozen if you can. When the flitches have been in salt fourteen days, remove them, wash freely in clean water, hang up to dry, and dust over with flour, or, if you are putting them away for old hams and bacon, dust over with pepper, and store away in bran or oat chaff till wanted for use, but be sure to let them hang till dry before storing away. Let the hams remain in salt twenty-one days for pigs of about 20 st. dead-weight. The great secret in curing bacon is to knock the meat about as little as possible both before and after killing.

MANURE FOR SWEET POTATOES.

AGRICOLA, Cooroy.—What is the best artificial manure for sweet potatoes? What is the most advantageous manner of applying such manure?

Answer.—90 lb. sulphate of potash } per acre;
90 lb. high-grade superphosphate }
90 lb. chili saltpetre }

or instead of 90 lb. high-grade superphosphate use 225 lb. superphosphate 16 per cent. Mix well.

Before spreading mineral fertilisers, apply stable manure or plough under a green crop. When the latter has rotted, spread the artificial fertiliser and plough it in. Then plant the vines.

The Markets.

AVERAGE TOP PRICES FOR OCTOBER.

Article.		OCTOBER. Top Prices. £ s. d.
Bacon	lb.	0 0 7⅝
Bran	ton	4 1 10½
Butter, First	lb.	0 0 9⅛
Butter, Second	,,	0 0 7⅛
Chaff, Mixed	ton	3 10 0
Chaff, Oaten	,,	5 15 0
Chaff, Lucerne	,,	3 0 7½
Chaff, Wheaten	,,	3 10 0
Cheese	lb.	0 0 5⅝
Flour	ton	7 15 0
Hay, Oaten	,,	5 12 6
Hay, Lucerne	,,	2 2 6
Honey	lb.	0 0 2
Rice, Japan (Bond)	ton	16 12 6
Maize	bush.	0 2 9
Oats	,,	0 3 3¼
Pollard	ton	4 3 1½
Potatoes	,,	8 5 0
Potatoes, Sweet	,,	
Pumpkins	,,	1 12 6
Sugar, White	,,	20 7 6
Sugar, Yellow	,,	18 2 6
Sugar, Ration	,,	15 7 6
Wheat	bush.	0 3 7¾
Onions	cwt.	0 15 7½
Hams	lb.	0 0 9
Eggs	doz.	0 0 7¼
Fowls	pair	0 4 4½
Geese	,,	0 5 8
Ducks, English	,,	0 4 8¼
Ducks, Muscovy	,,	0 5 3¾
Turkeys, Hens	,,	0 6 6
Turkeys, Gobblers	,,	0 14 8⅓

ENOGGERA SALES.

Article.	OCTOBER. Top Prices. £ s. d.
Bullocks	9 15 0
Cows	7 0 0
Wethers, Merino	0 14 10½
Ewes, Merino	0 11 11
Wethers, C.B.	0 13 9
Ewes, C.B.	0 13 9¾
Lambs	0 12 9
Baconers	1 13 6
Porkers	1 13 6
Slips	0 9 0

Orchard Notes for December.

By ALBERT H. BENSON.

In the Orchard Notes for November, I called special attention to the importance of marketing fruit properly, emphasising the necessity for careful handling, even grading, and attractive packing if satisfactory prices are to be obtained. Those remarks apply equally to the present month, or, in fact, to any month of the year, as there is always more or less fruit of one variety or another to be marketed; and it is simply wasting time and money cultivating, pruning, manuring, or spraying an orchard—in fact, doing everything possible to produce good fruit—if when the fruit is grown it is not put on the market in such a manner that it will realise the highest price. Careful handling, grading, packing, and marketing will secure a ready sale for good fruit in any market, even when the same fruit badly handled and unattractively got up would be unsaleable. Growers would do well to take a lesson in packing from the Californians who have been shipping apples, or from the Italians who are shipping lemons, to this colony, as those fruits, even after a long and trying voyage and one or more transhipments, reach here in better condition and in a much more attractive state than our local fruit, which is often only carted a few miles.

Keep down pests wherever met with; gather and destroy all fly-infested fruit. Destroy orange bugs before they become mature by hand-picking or by driving them to the trunks of the trees, by tapping the other branches with light poles, the insects being brushed off from the trunks and main branches on to a sheet placed under the tree to catch them, from which they can be easily gathered and burnt.

All caterpillars, cut-worms, beetles, grasshoppers, crickets, or other insects destroying the foliage should be destroyed by either spraying the same with Paris green, 1 oz. to 10 gallons of water, or by dusting them with a mixture of Paris green and air-slacked lime, 1 oz. of Paris green to 5 lb. of lime. Keep the orchard well cultivated, especially in the dry districts; and where there is water available for irrigation, in such districts all citrus trees should receive a watering during the month unless there is a good fall of rain, when it will be of course unnecessary.

Pineapples, bananas, and other tropical fruit can be planted during the month, showery weather and dull days being chosen. The rainy season is the best time to transplant most tropical plants. Where it is desirable to go in for green-crop manuring, or for raising a green crop for mulching, cow peas can be sown, as they will be found to make a very rapid growth now, which will be strong enough to keep most weeds in check.

See that all surface and cut-off drains are in good working order, and not choked up with grass, weeds, &c., as heavy rain may fall during the month, and there should be a get-away for all surplus water, which would tend to either wash the soil or sour it; stagnant water round the roots of the trees being exceedingly injurious at any time, and especially so during the heat of summer.

Farm and Garden Notes for January.

FARM.—The wheat harvest is now over, and the hopes and fears respecting the vicissitudes of the season for the past six months are blended into a satisfactory certainty. One of the largest crops of wheat and barley ever garnered in Queensland now reposes safely in stack or barn. The heavy work now begins of preparing the land for future crops. Maize may still be sown, particularly on the coast for a late crop, also sorghum, imphee, Cape barley, rye, panicum, and cow peas. As an experiment in some very early localities, potatoes for an early crop may be sown. They should be planted whole, and have plenty of room. But this is more a matter for market gardeners than for the farmer who plants largely during February and March.

KITCHEN GARDEN.—As we wrote last month, the weather is now too hot to look for much success with the ordinary European vegetables. Still much is possible to the man who has patience, judgment, and who exercises due care in sowing seeds, and protecting both them and the young plants from the fervid rays of the sun. Before sowing any seeds, the ground should be in fine tilth, and thoroughly soaked. Then sow thickly in small beds, and cover lightly with canvas or light brushwood. When the plants are up, keep the beds well watered till the former get strong. In favourable weather do the transplanting. Choose a showery day, lift the plants very carefully, and set out a little deeper than they grew in the seed bed, and firm the soil well around the roots; then water well. If suitable material can be got, mulch the ground for a few inches round the plants. This will save a great deal of watering and hoeing. Mulching is a garden operation which cannot be too highly recommended. All sorts of stuff may be used for the purpose—short stable manure, grass, leaves, litter—in fact, anything that can be conveniently placed round the plants. Mulching prevents the ground from baking in hot weather; it also prevents loss of moisture by evaporation, and preserves an equable temperature of the surface, and so promotes healthy, vigorous root action. Dig up all unoccupied ground, and turn under all refuse vegetable leaves and stable litter. If your land is heavy, only roughly break the lumps, and allow the sun, wind, and rain to do the rest of the breaking up. Then work the soil well, reduce it to a fine tilth, and sow in your seed beds French beans, cress, cauliflower, mustard, cabbage, celery, and radish for winter use. Parsley, parsnips, turnips, Brussels sprouts, carrots, peas, and endive may be sown. You might try cucumbers and melons for a late crop, but success will be very doubtful. Gather herbs for drying, onions, garlic, eschalots, &c.

FLOWER GARDEN.—Those who wish to make their gardens gay and attractive during the autumn and winter months can do so with the greatest ease. Prepare a few boxes. Make a compost, of which a great part should consist of rotted leaves. Fill the boxes with this, then sow thinly the seeds of annuals. Keep the surface of the soil moist, and, when the young seedlings are large enough to handle, lift them gently one by one, with a knife or a zinc label—never pull them up by hand. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Then look out for slugs and caterpillars. Keep a supply of tobacco dust on hand. Scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubby plants way be propagated by cuttings. Thus pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Foxhunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.